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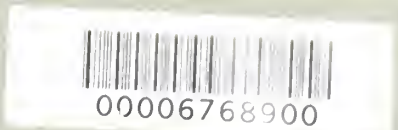
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WILLIAM P. SAUNDERS, DIRECTOR

COMMITTEE ON WATER RESOURCES, INLETS AND COASTAL WATERWAYS

CHAIRMAN — — — MILES J. SMITH
VICE-CHAIRMAN — CHARLES H. JENKINS
MEMBERS — — — SCROOP W. ENLOE, JR.
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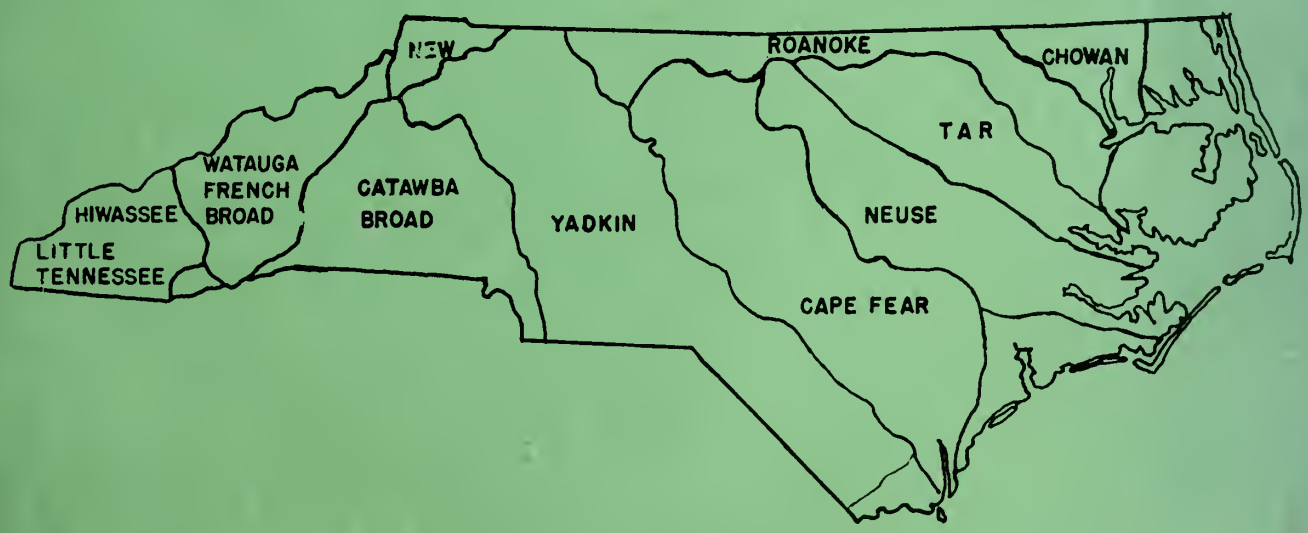
DIVISION OF WATER RESOURCES, INLETS AND COASTAL WATERWAYS

BEVERLY C. SNOW, CHIEF ENGINEER

Vol. VIII

WATER RESOURCES OF NORTH CAROLINA

BROAD AND CATAWBA RIVER BASINS



RALEIGH

1958

NORTH CAROLINA

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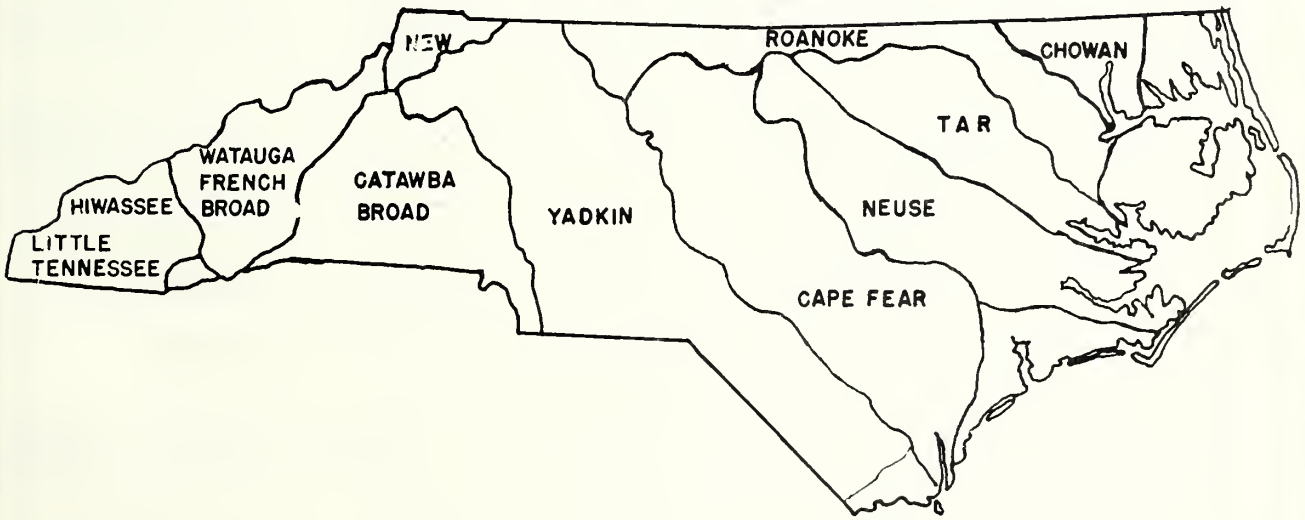

RALEIGH

1958

FOREWORD

This publication comprises Volume VIII of a series of twelve volumes containing information regarding water resources of North Carolina. Volumes I to VII, inclusive, were published as follows:

I	State as a whole, January 1955
II	Neuse River Basin, May 1955
III	Yadkin-Pee Dee River Basin, August 1955
IV	Chowan River Basin, December 1955
V	Roanoke River Basin, February 1957
VI	French Broad River Basin, November 1957
VII	Cape Fear River Basin, September 1958

Volumes IX - XII, inclusive, will provide inventories of water resources of the Tar-Pamlico, Hiwassee and Little Tennessee, Kanawha and Watauga, and Coastal Plain River Basins. Drafts of inventories of the water resources of these basins have been completed, and publication and distribution of the remainder of the series of twelve volumes will occur as rapidly as practicable. When the series has been published, probably by the end of 1959, information pertaining to the entire State will be available to assist in the orderly planning and development of the water facilities required for municipal and industrial expansion and for expansion of the uses of water for agriculture, and to guide watershed authorities basin associations, soil conservation districts, and other agencies, concerned with water uses, in accomplishing their purposes.

It is hoped that this publication will assist in the location, development, and expansion of municipal, industrial, agricultural, and other water supplies, and serve as a guide to the future study of water resources of the Broad and Catawba River Basins.

Grateful appreciation is hereby extended to persons who provided material for this volume as follows:

Chapter I - North Carolina State Planning Board, National Resources Committee, Corps of Engineers, U. S. Army, and Almanac Publishing Company, Raleigh, North Carolina.

Chapter II - Geological Survey, U. S. Department of the Interior.

Chapter III - Almanac Publishing Company.

Chapter IV - Geological Survey, U. S. Department of the Interior.

Chapter V - Corps of Engineers, U. S. Army, Duke Power Company, and Almanac Publishing Company.

Chapter VI - Geological Survey, U. S. Department of the Interior.

Chapter VII - Geological Survey, U. S. Department of the Interior.

Chapter VIII - Geological Survey, U. S. Department of the Interior.

Chapter IX - North Carolina State Stream Sanitation Committee.

Chapter X - Soil Conservation Service, U. S. Department of Agriculture.

Chapter XI - Corps of Engineers, U. S. Army.

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CHAPTER I - DESCRIPTION OF WATERSHED

A considerable part of the information contained in this chapter has been obtained from Document No. 96, House of Representatives, 73rd Congress, 1st Session, and "Report on Water Resources", published by the North Carolina State Planning Board in 1937.

Main Streams - The Catawba and Broad River Basins, lying in the western-central portion of North Carolina, form the upper part of the Santee River Basin of South Carolina. The drainage area of the Catawba River Basin in North Carolina is 1,450 square miles. The Broad River Basin in North Carolina has a length of about 27 miles and an average width of about 54 miles, and the Catawba River Basin in North Carolina has a length of approximately 108 miles and an average width of about 35 miles. The basins are bordered on the east by the Yadkin River Basin, on the north by the Watauga and Yadkin-Pee Dee River Basins, and on the west by the French Broad River Basin.

The Catawba River rises in the Blue Ridge mountains in the southwestern corner of McDowell County near the Buncombe-McDowell County Line; flows northeasterly through McDowell County and easterly through Burke County; forms successively the Caldwell-Catawba, Alexander-Catawba, Iredell-Catawba, Iredell-Lincoln, Mecklenburg-Lincoln, and Mecklenburg-Gaston County Lines; and enters South Carolina about 21 miles southwest of Charlotte. It flows in a southerly direction in South Carolina to its confluence with Big Wateree Creek, forming the Wateree River about 20 miles above Camden. The Wateree River joins the Congaree River about 30 miles southeast of Columbia, forming the Santee River, which flows in a generally southeasterly direction and empties into the Atlantic Ocean about 10 miles southwest of Winyah Bay. From the headwaters of Lake James, near the Burke-McDowell County Line, to the South Carolina State Line, the river has a total length of about 150 miles. The elevation of the former point is about 1,200 feet, and of the latter approximately 510 feet. Since the total fall of the stream is 690 feet in 150 miles, its average slope is 4.6 feet per mile.

The Broad River rises on the eastern slope of the Blue Ridge Mountains in the southeastern corner of Buncombe County about seven miles north of Hickory Nut Gap; flows easterly and southerly in Buncombe County, generally southeasterly through Rutherford County, and easterly and southerly in the southwest corner of Cleveland County; and enters South Carolina about 10 miles slightly southwest of Shelby. It flows in South Carolina in a generally southeasterly direction to its confluence with the Saluda River, forming the Congaree River at Columbia. At the headwaters of Lake Lure in the western part of Rutherford County, the river has an elevation of about 1,000 feet, and 51 miles below, where it enters South Carolina, it has an elevation of about 580 feet. The average fall of the river during this reach is about 8.2 feet per mile. The fall is concentrated at numerous shoals and rapids, which afford good locations for power and storage development.

Principal Tributaries - The principal tributaries of the Catawba River are the Warrior Fork Catawba, Linville, South Fork Catawba, and Johns Rivers. The principal tributaries of the Broad River are the Green, First Broad and Second Broad Rivers, and Buffalo Creek.

Warrior Fork Catawba River is formed by the confluence of Rose Creek and Steels Creek in Burke County about 5.5 miles northwest of Morganton. Rose Creek and Steels Creek rise in Pisgah National Forest, in the northwestern corner of Burke County and on the slopes of Tablerock Mountain and Windingstair Knob, respectively. Warrior Fork Catawba River flows a short distance southeasterly and joins Catawba River about 1.5 miles north of Morganton.

Linville River rises in Avery County about three miles southwest of Grandfather Mountain, flows southwesterly in Avery County and southeasterly and southerly in Burke County, and joins Catawba River after flowing through, and about 0.5 mile southeast of, Lake James.

Johns River rises in Caldwell County near Watauga-Caldwell County Line, flows southerly and southwesterly in Caldwell County and southwesterly and southeasterly in Burke County, and joins Catawba River about three miles northeast of Morganton.

South Fork Catawba River rises in Catawba County about 5.5 miles west of Conover; flows southerly in Catawba County, slightly southeasterly through Lincoln County, and southeasterly through Gaston County; and joins Catawba River on the North Carolina-South Carolina State Line about 22 miles southeast of Gastonia.

Green River rises in the south-western corner of Henderson County about one mile northeast of Standingstone Mountain on the North Carolina-South Carolina State Line; flows slightly northeasterly in Henderson County and through Lake Summit, and northeasterly, easterly, and southeasterly through Polk County and through Lake Adger; and joins Broad River on the Polk-Rutherford County Line about 13 miles east of Columbus.

Second Broad River rises in the northwestern corner of Rutherford County, on the slope of Mike Mountain and near the McDowell-Rutherford County Line; flows generally southeasterly through Rutherford County; and joins Broad River on the Rutherford-Cleveland County Line about 14 miles southeast of Spindale.

First Broad River rises in the northeastern corner of Rutherford County on the south slope of South Mountain and near the Burke-Rutherford County Line; flows southeasterly in the northeast part of Rutherford County and southeasterly and southerly through Cleveland County; and enters South Carolina about nine miles slightly southwest of Shelby.

Buffalo Creek rises in Cleveland County about 3.5 miles east of Lawndale, flows generally southerly through Cleveland County, and enters South Carolina about nine miles slightly southeast of Shelby.

Topography - The combined Broad and Catawba River Basins may be divided into two well-defined physiographic regions: the Piedmont Plateau and the Mountain region. The Piedmont Plateau consists of a rolling terrain, attaining an elevation of about 1200 feet where it blends into the foothills of the Mountain region, composed of rugged foothills and mountainous reaches having extremely heavy rainfall and high run-off factors. The main crest of the Blue Ridge varies from 4,000 to 5,000 feet, with an off-shoot of the Black Mountain Range culminating in Mount Mitchell, elevation 6,684 feet, in Yancey County about four miles northwest of the Catawba-French Broad watershed. Lesser peaks are Grandmother Mountain, elevation 4,686 feet, in the northwestern corner of the Catawba River Basin, and Grandfather Mountain, elevation 5,964 feet, on Catawba-Watauga watershed.

Geology - The geologic formations of the Piedmont Plateau belong to the Algonkian and Archaean eras, and are believed to be the most ancient of rocks. The formations are found mainly in two groups of widely different age and character: (1) sedimentary strata of Pre-Cambrian age, including conglomerate sandstone, shale, limestone, and their metamorphosed equivalents; and (2) igneous and metamorphic rocks, including gneiss, schist, granite, diorite, and similar formations of the Archaean age.

The succession of belts of shales and schists, and granites and gneisses, which make up the geologic formations of the Piedmont plateau, extend in a northwest-southeast direction parallel to the mountains and the seashore. The rocks,

which occur, differ widely in character and are eroded with varying rapidity by the rivers, leaving the harder strata projecting upward as ledges and the intervening softer-strata eroded to form depressions, thereby giving rise to pools and rapids which are well adapted to power development. South Fork Catawba River is typical of the streams of the Piedmont Plateau. The outcrops of schists have a general northeast strike and dip sharply to the northwest, while the stream flows in a generally southeasterly direction.

The Mountain region is formed by the Blue Ridge Mountains which constitute a great divide between the Atlantic Ocean and the Gulf of Mexico watersheds. The rock formations, classified as Archaean, are similar to those of the Piedmont Plateau, though perhaps, in general, somewhat older. They include gneiss, mica-gneiss, diorite, and granite. The Carolina gneiss is the oldest known of all formations. It is extensively exposed in the headwaters of the Catawba River. At many places, it is overlain by the sedimentary rocks of the Cambrian period.

Good foundation-conditions exist for dams of great weight in the Broad and Catawba River Basins. Because of the high percentage of clay in the overlying soils, it is believed that losses by seepage from impounding reservoirs will be slight in this region.

Forest Cover and Climate - In the Broad River Basin, 58 per cent of the area consists of forest lands, of which some 56 per cent were, in 1937, forest woodland, including about 76,500 acres of woodland pasture. In the Catawba River Basin, approximately 57 per cent of the area comprised forest lands, of which about 56 per cent consisted of forest woodland, including 135,000 acres of woodland pasture. It was estimated that the stands of timber in the combined basins was about 1.216 billion board feet.

Mean annual temperature in the Catawba River Basin varies from 61 degrees in the extreme lower (southeastern) part to 50 degrees in the upper (northwestern) part. In the Broad River Basin, the mean annual temperature varies from 61 degrees in the southeastern corner to 56 degrees in the extreme upper part. The 59-degree isotherm crosses at about the center of both basins. For the entire area, the mean annual temperature is 58.9 degrees.

Mean annual rainfall in the Catawba River Basin varies from 47 inches in the lower part to 59 inches in the extreme upper part, with a mean of about 50 inches for the basin. In the Broad River Basin, the mean annual rainfall varies from 50 inches in the southeast corner to 57 inches in the northwest corner, and increases to over 65 inches in the extreme southwest corner. The mean for this basin is approximately 55 inches. The mean annual rainfall for both basins combined is slightly less than 52 inches. The minimum annual-rainfall occurred at Caroleen, on the Second Broad River in the southeastern corner of Rutherford County, in 1925 and amounted to 24.85 inches. The maximum annual rainfall occurred at Marion, near the Catawba River in the east-central part of McDowell County, in 1901 and amounted to 87.27 inches.

Population and Industry - The combined population of the Catawba and Broad River Basins increased from 234,899 in 1900 to 466,093 in 1930, or nearly 100 per cent. Populations for the basins, in 1940 and 1950, are not available.

There are a considerable number of important cities and towns in these basins which are in the heart of the industrial development of North Carolina and South Carolina. Charlotte, the principal city, is the largest in either North or South Carolina, having populations, in 1930, 1940, and 1950, of 82,675, 100,899,

and 134,042, respectively. This city is a rapidly-growing industrial, manufacturing center. Gastonia (1940: 21,313 and 1950: 23,069), Hickory (1940: 13,487 and 1950: 14,755), Lenoir (1940: 7,598 and 1950: 7,888), and Morganton (1940: 7,670 and 1950: 8,311) are also located in the Catawba River Basin and are growing industrial and trading centers.

The largest town in the Broad River Basin is Shelby, having populations, in 1930, 1940, and 1950, of 10,789, 14,037, and 15,508, respectively. Other principal towns in this basin are Kings Mountain (1940: 6,547 and 1950: 7,206), Forest City (1940: 5,035 and 1950: 4,971), and Spindale (1940: 3,952 and 1950: 3,891).

To give some indication of the industrial development of the Catawba and Broad River Basins in North and South Carolina, comprising part of the Santee River Basin, the following quotation is taken from Document No. 96, House of Representatives, 73rd Congress, 1st Session, referred to in the first paragraph of this chapter:

"The Santee River Basin may well be termed 'The Hub' of the recent, marked industrial-development of the South, a development in which hydro-electric power, and that of this basin in particular, has played a leading part. The 6,578,000 cotton-mill spindles in the Santee Basin constitute 56.3 per cent of the total number in North Carolina and South Carolina, 35.3 per cent of the 18,614,000 in the 14 Southern States, and 19 per cent of the spindle-installation of the United States. Thus, it will be seen that the portion of the Piedmont Plateau within the basin is one of the most important textile-areas in the United States. The favorable climate, the cheaper labor, the ample supply of dependable power, the proximity of raw materials, and the good transportation-facilities are all factors that are favorable to the textile and other industries in this section."

The following tables show figures pertaining to population and industries located, in 1937, in the Catawba and Broad River Basins:

Catawba River Basin	1900	1910	1920	1930
Total population	177,716	216,261	255,894	365,511
% Urban	14	23	31	38
% Rural	86	77	69	62
% Employed in industries	6.2	-	10.4	12.5
Number of establishments	695	-	606	593
Number of employees	11,094	-	26,726	45,293
Total wages	$2,168,787	-	$18,789,905	$33,597,383
Average wage	$195	-	$703	$742
Value of products	$14,413,759	-	$142,028,413	$209,157,702
Cost of materials, etc.	$8,916,226	-	$89,425,662	$124,853,608
Value added by manufacturing	$5,497,533	-	$52,602,751	$84,322,094

Broad River Basin				
Total population	57,183	65,519	74,530	102,382
% Urban	0	5	9	23
% Rural	100	95	91	77
% Employed in industries	5.1	-	7.6	8.7
Number of establishments	277	-	110	96
Number of employees	2,934	-	5,629	8,889
Total wages	$412,677	-	$3,585,067	$6,648,578
Average wage	$141	-	$637	$748
Value of products	$2,913,447	-	$22,909,994	$36,711,124
Cost of materials, etc.	$1,631,138	-	$14,332,380	$22,779,412
Value added by manufacturing	$1,282,309	-	$8,577,614	$13,931,712

From the above tables, it appears that the per cent of rural population in the Catawba River Basin decreased from 86 per cent to 62 per cent during three decades and, for the Broad River Basin, decreased from 100 per cent to 77 per cent for the same period. This change may be explained in part by the concentration of industrial development, with a corresponding increase in size of the principal cities. These two basins comprise about 10 per cent of the area of the State of North Carolina and about 15 per cent of the population.

An inspection of the tables indicate that, in the Catawba Basin, the number of establishments decreased from 695 to 593 during the three decades. A corresponding decrease took place in the Broad Basin during the same period. However, even with the decrease in the total number of industrial establishments, the industries steadily increased the number of employees over the period. In the Catawba Basin, they employed 12.5 per cent of the total population for 1930, and 8.7 per cent in the Broad River Basin for the same year. Total wages paid employees in both basins in 1930 was $40,245,961, while the total value of products manufactured in the combined basins for the same year amounted to $245,868,826. Other information relating to the industrial establishments of these two basins is given in the table.

Agriculture - In the Piedmont section of the basins, the soil is that designated as "Cecil", mostly red in color. In texture, it ranges from sandy loams to clay-loams and clay, which produce a great variety of agricultural products. Clover, forage, and hay crops are grown extensively in the clay-loam soils. Tobacco is grown in the sandy loam, while cotton and corn are grown extensively in the heavier clay-types. Cotton is the principal product, this being one of the best regions of the State for its cultivation. Dairying is a growing industry, due to the favorable conditions for raising hay and forage.

In the Mountain region, the soils are usually rich and, in the valleys and gentle slopes which have been cleared, a large amount of corn, hay, potatoes, fruit, and small grains is produced.

Lumbering - Lumbering is carried on, to some degree, in every portion of the basin. Much of the timber has been cut over many times, and the present stand is, for the most part, second-growth timber, with pine the principal reforesting-species. Principal types of commercial timber, found in these basins, are pine, oak, poplar, and chestnut.

The Pisgah National Forest lies in and along the western portion of the basins and, in addition, there are some large private forests which are being preserved. Fire prevention and forestry methods are being practiced with the aim of reforesting unproductive lands and protecting existing tracts.

Mining - Mining forms an important industry in portions of the basins, there being only three counties lacking minerals in some form in commercial quality. Among those found in quantities large enough to merit attention are: asbestos, feldspar, mica, iron and tin ore, Kyanite, Kaolin, leopardite, lead, zinc, slates, limestone, granites, gneisses, quartz, barite, galena, sphalerite, clays, and hiddenite. The only appearance in the State of the mineral hiddenite occurs in Alexander County. There are large deposits of magnetic-iron ore in Avery County, and of leopardite in Mecklenburg County, and many of the other minerals listed above appear, scattered throughout the basins. Extensive working of pottery, clay, and building stone is carried on over a good portion of the area. A summary of the number of mines in the basins, reported in 1937, is given below:

Type	Catawba Basin	Broad Basin
Granite	7	1
Sand and Gravel	1	1
Mica	2	3
Limestone	2	-
Gold	5	3
Tin	1	1

Transportation - None of the streams in the Broad or Catawba River Basins are navigable for any appreciable length for any water craft, except very small pleasure boats between the power dams.

Principal railway lines, operating in the basins, are the Seaboard Air Line and the Southern Railway systems. These form the major lines which are interconnected to a number of smaller systems to make a network of railroads covering both basins. Railway facilities are ample in both basins.

There are numerous first and second class highways throughout the area of both basins. These highways are ample to meet the needs for automotive transportation.

Mapping - Plan and profile maps for the Broad and Catawba Rivers have been prepared by the Corps of Engineer, U. S. Army. Topographic maps have been prepared by the U. S. Geological Survey for a considerable portion of the area covered by the Broad and Catawba River Basins.

General Information regarding Counties within or partially within the Catawba and Broad River Basins

Alexander County - In the northwest Piedmont, Alexander is generally hilly with a broad central-valley and mountains in the Northwest. The rare mineral, hiddenite, has been found in this county. Some geologists maintain that the area is rich in unexploited minerals. Principal merchantable timbers are pine, oak, and poplar. Waters include the Catawba, Lower Little, Middle Little, and South Yadkin Rivers, Lake Hickory, and numerous creeks.

Predominantly agricultural, the chief crops are tobacco, corn, and cotton. The county is well adapted to fruit culture, especially apples. There are 60 grade-A dairies in the county. Most of the industrial employment occurs in textiles, lumbering, and brick manufacture. Cotton-textile mills, knitting mills, and sawmills are concentrated at Taylorsville. The county has small enterprises which manufacture chairs, boxes, and plywood.

Communities include Taylorsville, county seat, Stony Point, and Millersville.

Railfall (inches)	49.64
Snowfall (inches)	9.6
Mean annual temperature (degrees)	58.7
Growing season (days)	207
Tobacco (1951 Val.)	$1,145,990
Corn (1951 Val.)	$422,970
Cotton (1951 Val.)	$115,870
Total Land Area (acres)	163,200
Forest Area (acres)	89,800
Population (1940)	13,454
Population (1950)	14,554
Total Tax Val.	$17,281,210
Tax Rate	$ .85

Avery County - This county lies in the northwest-mountain region and is one of the highest and most rugged counties in the State. It is predominantly rural. Feldspar and mica are produced, and asbestos and iron ore have been mined in the past. Remaining forests contain dead chestnut, oak, and hemlock. Streams in the Catawba River Basin include headwaters of Linville River, and headwaters of Harper and Wilson Creeks, which flow through the Boone Wildlife Management Area.

Farming, mining, and lumbering are the chief occupations. There are 55 certified seed-potato growers in the county. Vegetables, corn, and potatoes are the leading staples. Some tobacco is raised, and some livestock is produced. Small grain, including oats and buckwheat, is grown. Collection of herbs ("Yarbing") provides off-season income for some persons. The tourist business is substantial.

Communities in the Catawba River Basin include Linville, Roseborough, Montezuma, Pineola, Crossnore, and Altamont.

Rainfall (inches)	47.62
Snowfall (inches)	39.0
Mean annual temperature (degrees)	50.5
Growing season (days)	148
Tobacco (1951 Val.)	$119,390
Irish & sweet potatoes (1951 val.)	$193,950
Corn (1951 val.)	$128,650
Total Land Area (acres)	158,080
Forest Area (acres)	99,400
Population, 1940	13,561
Population, 1950	13,352
Total Tax Val.	$5,914,936
Tax Rate	$1.98

Burke County - A central Mountain County, Burke is high and mountainous, with fertile valleys through its central part. Asbestos and gold have been found in the county. Brick clays are located near Morganton. Forests contain pine, oak, and poplar. The county is drained by the Catawba, Johns, and Linville Rivers and numerous creeks. The county contains Lake James and Lake Rhodhiss on the Catawba River, used for generation of hydroelectric power.

Vegetables, wheat, hay, and corn are the chief crops, and 14.2 percent of the farm income is derived from dairy products. The county is highly industrialized, and over 40 per cent of employment is in textile, hosiery, and furniture factories. A number of small sawmills are operated. The county contains the Great Lakes Carbon Corporation. The State Hospital for the Insane and the School for the Deaf are located at Morganton.

Communities include Morganton, county seat, Valdese, Drexel, Glen Alpine, Connelly Springs, Rutherford College, Jonas Ridge, Icard, Linville Falls, Perkinsville, Hildebran, Henry River, and Rhodhiss.

Rainfall (inches)	57.6
Snowfall (inches)	23
Mean annual temperature (degrees)	59.0
Corn (1951 val.)	$462,600
Wheat (1951 val.)	$171,640
Hay (1951 val.)	$293,390
Total Land Area (acres)	323,840

Burke County Cont'd.

Forest Area (acres)	253,600
Population (1940)	33,615
Population (1950)	45,518
Total Tax Val.	$54,000,000
Tax Rate	$1.00

Caldwell County - In the eastern mountains, Caldwell is a high county with the Blue Ridge Mountains on its western border and the Brushy Mountains in the north. It contains the famous Happy Valley, a fertile farmland. The inhabitants of this valley have long opposed the construction of the proposed dam on the Yadkin River upstream from Wilkesboro. Some asbestos occurs in the county, and manganese ore has been found. One of the largest ilmenite-mines in the United States is in operation. Some granite-gneiss is located in the county. Forest area is mostly pine and oak, with some poplar. Pisgah National Forest extends into the western edge. Waters in the Catawba River Basin include the Catawba, Johns, Upper Little, and Middle Little Rivers, and numerous creeks.

Corn, hay, forage, wheat, fruit, and other products are raised. Dairy products, livestock, and poultry are income producers. Timber and other forest products are important. Industrial activity is divided between textiles, furniture, and enterprises relating to these industries. North Carolina furniture-manufacture began in Caldwell County, and Lenoir ranks as the leading center in this industry.

Communities include Lenoir, county seat, Granite Falls, Hudson, Whitnell, Patterson, Collettsville, and Saw Mills.

Rainfall (inches)	50.14
Snowfall (inches)	10.3
Mean annual temperature (degrees)	58.5
Growing season (days)	186
Hay (1951 val.)	$540,180
Livestock (1949 val.)	$654,100
Corn (1951 val.)	$434,240
Total Land Area (acres)	304,640
Forest Area (acres)	219,000
Population (1940)	34,795
Population (1950)	43,352
Total Tax Val.	$66,817,798
Tax Rate	$ .90

Catawba County - On the western edge of the Piedmong, Catawba is high and rolling. Minerals found in this county are slate, manganese, colomitic limestone, and pottery clays. Merchantable timbers include shortleaf pine, spruce pine, and oak. Waters include the Catawba, Henry Fork Catawba, Jacob Fork Catawba, and South Fork Catawba Rivers, and numerous creeks. A chain of dams has been built on the Catawba River, furnishing power for the industrial development.

Corn is the chief cash crop, followed by hay and cotton. Considerable cultivation of vegetables, particularly sweet potatoes, occurs. Much grain, especially wheat, is grown. The area is suited to cultivation of fruits. Manufacture of textiles, including hosiery, is by far the leading industry, followed by furniture making. Industrial plants are scattered throughout the county. Hickory is the leading industrial center and contains Lenoir-Rhyne College, a coeducational Lutheran institution.

Communities, in addition to Hickory, include Newton, county seat, Conover, Brookford, Maiden, Claremont, Catawba, Longview, Startown, and Terrell.

Rainfall (inches)	49.64
Snowfall (inches)	9.6
Mean annual temperature (degrees)	59.8
Growing season (days)	207
Cotton (1951 val.)	$554,970
Hay (1951 val.)	$740,240
Corn (1951 val.)	$771,700
Total Land Area (acres)	259,840
Forest Area (acres)	107,000
Population (1940)	51,653
Population (1950)	61,794
Total Tax Val.	$87,932,862
Tax Rate	$ .80

Cleveland County - In the southwest Piedmont, Cleveland borders on South Carolina. The land is typically Piedmont, rolling toward the Blue Ridge on the west. Minerals include low-grade manganese slate, chrystalline, high magnesium, limestone, tin ore, emerald mica, kaolin clay, and brick clay. Chief merchantable timbers are oak, poplar, and hickory. Waters include the Broad and First Broad Rivers and numerous creeks. The county has several lithia and sulphur springs which once attracted visitors.

Cotton dominates the county, agriculturally and industrially. Cleveland County produces more cotton than any other county in North Carolina. Sweet potatoes, fruit, and small grains are other prominent crops. Poultry, livestock, and dairying are important sources of farm income. Cleveland County, in 1954, raised more turkeys than any other county. Thirty or more textile plants, which include cotton textiles, rayon and silk, knitting and similar enterprises, are located in the county. Industries are largely concentrated at Shelby and Kings Mountain. Cottonseed oil, fertilizers, food products, and lumber mills are among the many enterprises. The largest potted-plant-producing hothouse in the South is located at Shelby. Gardner-Webb Junior College is near Shelby.

Communities include Shelby, county seat, Kings Mountain, Lawndale, Boiling Springs, Grover, Lattimore, Casar, Fallstone, Mooresboro, Waco, Earl, Belwood, and Patterson Springs.

Rainfall (inches)	47.68
Snowfall (inches)	7.1
Mean annual temperature (degrees)	61.4
Cotton (1952 val.)	$8,750,000
Dairying (1952 val.)	$3,000,000
Livestock (1952 val.)	$2,000,000
Total Land Area (acres)	298,240
Forest Area (acres)	105,800
Population (1940)	58,055
Population (1950)	64,357
Total Tax Val.	$58,886,655
Tax Rate	$1.04

Gaston County - The terrain of Gaston County, in the southwest Piedmont, is rolling. Its minerals consist of barite-bearing veins along with quartz, galena, and sphalerite south of Bessemer City, tin ore near Kings Mountain, and ceramic quartz near Mt. Holly and Belmont. Residual clays, suitable for brick manufacture, are also found. Principal merchantable species of trees are loblolly and oak.

Waters include the Catawba and South Fork Catawba Rivers, Mountain Island and Catawba Lakes (hydroelectric developments), and numerous creeks.

The chief crop is cotton, followed by corn. Livestock are important, and dairy products are increasing. Small grains and some feed and truck crops are grown. Heavily industrialized, the county is the world's combed-yarn-manufacturing center. The main industry is the manufacture of textiles which include combed-cotton yarn, silk, rayon, and knitting manufactures. The largest mills are at Gastonia and Cramerton. In Gastonia alone, there are 62 textile plants in addition to 95 smaller industries and a large retail trade. Among the products of the textile manufacturers are cotton yarns, tire fabric, bedspreads, sewing thread, knitting yarns, twine, dress goods, drapery, upholstery fabrics, hosiery, sheeting, etc. Numerous plants, manufacturing special textile-machinery, are located in Gastonia. Other industries thereat and in the county are food products, lumbering, furniture products, paper products, leather, brick, iron and steel and nonferrous-metal products, brooms, brushes, and automobile accessories.

Educational facilities include Belmont Abbey College, one of the oldest Catholic educational institutions in the South, Sacred Heart Academy, and North Carolina Vocational School. Points of interest comprise Belmont Abbey, the center of an independent diocese attached to the papacy, and the power dam at High Shoals on the North Fork Catawba River near the Lincoln-Gaston County Line.

Communities include Gastonia, county seat, Cramerton, Belmont, Bessemer City, Cherryville, Mount Holly, Lowell, Dallas, North Belmont, Stanley, High Shoals, and McAdenville.

Rainfall (inches)	45.87
Snowfall (inches)	6.02
Mean annual temperature (degrees)	60.6°
Growing season (days)	222
Livestock (1952 val.)	$1,877.300
Cotton (1952 val.)	$1,137,500
Corn (1952 val.)	$465,000
Total Land Area (acres)	229,120
Forest Area (acres)	87,910
Population (1940)	87,531
Population (1950)	110,836
Total Tax Val.	$180,000,000
Tax Rate	$ .92

Lincoln County - Lying in the southwest Piedmont section, Lincoln has a hilly topography with peaks of the Blue Ridge chain lying in the distance. There are limestones, clays, and some iron ore around Lincolnton, and slates occur in the eastern portion of the county. Tin deposits once were actively mined. Chief merchantable species of trees are shortleaf pine, spruce pine, and oak. Waters include the Catawba and South Fork Catawba Rivers and Indian, Howards, Clark, Leepers, Mill, Leonard Fork, Anderson, Killian, and other creeks.

Cotton is the leading cash crop. Also important are corn, hay, wheat, Irish and sweet potatoes, and oats. Livestock raising and dairying are increasing. Poultry production is expanding. Cotton-textile manufacturing is the principal industry. In addition, there are furniture factories, wholesale-food companies, machine shops, cement plants, an iron foundry, flour mills, hosiery mills, and garment factories. Lumbering is active with sawmills throughout the county.

Communities include Lincolnton, county seat, Denver, Crouse, Southside, Long Shoals, Triangle, Vale, and Lowesville.

Rainfall (inches	47.38
Snowfall (inches)	8.4
Mean annual temperature (degrees)	58.6
Growing season (days)	194
Cotton (1952 val.)	$1,500,000
Livestock Products Sold (1952 val.)	$1,200,000
Corn (1952 val.)	$500,000
Total Land Area (acres)	197.120
Forest Area (acres)	63,800
Population (1940)	24,187
Population (1950)	27,459
Total Tax Val.	$31,325,493
Tax Rate	$1.30

McDowell County - In the mountain section and lying on the eastern slope of the Blue Ridge range, the topography of McDowell County ranges from high peaks in the far west to low foothills in the east. Minerals occur chiefly in the north and western portions of the county. These minerals include brown-iron ore, graphite slates, limestone, gneiss, and feldspar. Small-scale mining of limestone, feldspar, and copper is carried on. Chief merchantable species of trees are chestnut, pine, and oak. Waters include the Catawba, North Fork Catawba, and Second Broad Rivers, and Cove, North Muddy, South Muddy, Crooked, Buck, Jarrett, Mill, and other creeks.

The chief cash crops are corn, vegetables, fruits, and nuts. Small grains are grown, and livestock are expanding. Large cotton-textile, hosiery, and other knitting mills are located at Marion. Other industries include furniture factories, machine manufactures, planing and plywood mills, a paper-box factory, and a large rayon-finishing plant. The American Thread Company has built a $15,000,000 plant at Sevier. There is also a manganese plant nearby.

Communities include Marion, county seat, East Marion, Clinchfield, Old Fort, Cross Mill, Ashford, Nebo, Garden City, Glenwood, Little Switzerland, and Sevier.

Rainfall (inches)	56.93
Snowfall (inches)	11.6
Mean annual temperature (degrees)	57.7
Growing season (days)	192
Corn (1951 val.)	$340,770
Hay (1951 val.)	$93,910
Soy Beans (1951 val.)	$48,280
Total Land Area (acres)	282,880
Forest Area (acres)	205,600
Population (1940)	22,996
Population (1950)	25,720
Total Tax Val.	$32,232,763
Tax Rate	$1.00

Mecklenburg County - Characteristic of the industrial Piedmont in which it lies, Mecklenburg has a high, rolling topography. Gold has been mined in the county, and there are numerous granite-outcrops and some leopardite. Some sands and gravel, suitable for construction purposes, also occur. Chief merchantable species of trees are shortleaf pine and oak. Waters include the Catawba River; Davidson, McDowell, Long, Paw, McAlpine, Sugar, Little Sugar, and other creeks;

and Catawba and Mountain Island Lakes (hydroelectric developments).

Cotton is the chief cash crop and is used in the county's numerous textile plants. Livestock products, chiefly dairy and beef cattle, hay, and other feed crops are also important. The northern portion of the county is rich in truck-crops, peaches, and poultry. Textiles, food-products, printing, chemicals, fertilizers, machinery, furniture, wood-products, rubber, leather, stone, clay, iron, steel, etc., are some of the numerous products manufactured in the county. Textiles manufactured include cotton, rayon, silk, woolen and worsted hosiery, other knitting-mills apparel, and miscellaneous textile-products.

Davidson College, located at Davidson, was founded in 1837. Some of its distinguished alumni include President Woodrow Wilson and R. B. Glenn, a former Governor of North Carolina. Queens College for Women, operated by regional Presbyterians, and the Johnson H. Smith Negro University are located in Charlotte.

Communities include Charlotte (1940: 100,889, 1950: 133,212), the county seat and largest city in the State, Davidson, Cornelius, Pineville, Thrift, Huntersville, Derita, Matthews, Newell, Homestead, and Mint Hill.

Rainfall (inches)	44.22
Snowfall (inches)	6.5
Mean annual temperature (degrees)	61.5
Growing season (days)	238
Cotton	$1,640,000
Poultry and Eggs	$1,170,000
Livestock	$400,000
Hay (1947 val.)	$989,680
Total Land Area (acres)	346,680
Forest Area (acres)	165,700
Population (1940)	151,826
Population (1950)	197,052
Total Tax Val. (1952)	$287,719,435
Tax Rate (1952)	$1.02

Polk County - This county lies in the southeastern-mountain region and has an unusually mild climate. The pleasant weather of the county is due to the peculiar thermal belts, usually free from dew and frost, which extend along the slopes. The belts are found at varying altitudes in the mountsins, and their existence depends upon the contours of the ranges. In some instances, thermal conditions exist on mountain summits, and, in others, they occupy a narrow area in a valley. Chief merchantable species of timber are oak, pine, and poplar. The county is watered by the Green, Broad, and Pacolet Rivers; Walnut, Whiteoak, Ostin, Britten, Brights, and other creeks; and Lake Adger.

The agricultural area lies in the eastern portion of the county which produces considerable fruit in the high-mountain section. Polk is the most western cotton-county in the State. Cotton, corn, and vegetables are the chief crops, although some of the best vineyards in the State are found here. Peaches and applies are also grown. The county's industries are confined to Tryon, Columbus, and Saluda where there are silk, rayon, and woolen mills. Lumbering and the tourist industries are the only other enterprises of note. The latter is of prime importance to the county's economy. The dry, moderate climate, and the beauty of the scenery in numerous parts of the county, attract many visitors, especially in the fall and spring. Communities include Columbus (county seat), Tryon, Saluda, Lynn, Mill Spring, Green Creek, and Sunnyview.

Rainfall (inches)	59.11
Snowfall (inches)	7.5
Mean annual temperature (degrees)	60.6
Growing season (days)	197
Cotton (1952 val.)	$385,000
Corn (1952 val.)	$240,000
Fruits and nuts (1953 val.)	$120,000
Total Land Area (acres)	149,760
Forest Area (acres)	91,900
Population (1940)	11,874
Population (1950)	11,627
Total Tax Val.	$8,531,812
Tax Rate	$2.10

Rutherford County - In the western-Piedmont and the eastern-Mountain regions, Rutherford's topography is from high and rolling in the east to mountainous in the west. The Blue Ridge Mountains are first encountered at Lake Lure in the northwestern part of the county. Here, Hickory Nut Gorge formed an ancient trail into Buncombe County, and it is believed DeSoto's explorers came along this route in the 16th century. Later, it was one of the first stage-coach routes from east to west.

The sole mineral-product of the county is brick from plain clays near Bostic. However, prior to 1849, gold was mined near Rutherfordton, and, from 1790 to 1840, this area was the center of the gold-mining industry of the nation. Christopher and Augustus Bechtler minted gold coins here under Government license from 1831 to 1842. There has been some mica production in the past, particularly near Rutherfordton. Along the Broad and Second Broad Rivers, there are gravel deposits of crystalline rock which vary in size from sand to large boulders. Chief merchantable species of trees are pine, oak, and poplar. In the western section of the county, typical mountain-forests of chestnuts, red and chestnut oaks, and other species occupy the upper slopes of the Blue Ridge Mountains. Waters include the Broad, First Broad, and Second Broad Rivers; Lake Lure (man-made) on the Broad River; and Cove, Cane, and other creeks.

Cotton and corn are the main cash crops. Other sources of farm income are wheat, oats, fruits, vegetables, bees, poultry, and livestock. The county is an important textile-center, with about twenty plants manufacturing products from cotton, wool, and silk. Other manufactures are lumber, food, printing and publishing, a leather factory, and a brick plant. Chimney Rock and Lake Lure, well-known resorts, provide a large income from tourists.

Communities include Rutherfordton (county seat), Forest City, Spindale, Cliffside, Henrietta, Caroleen, Alexander Mills, Ellenboro, Avondale, Ruth, Lake Lure, Chimney Rock, Union Mills, and Bostic.

Railfall (inches)	52.03
Snowfall (inches)	12.1
Mean annual temperature (degrees)	59.8
Growing season (days)	202
Cotton (1952 val.)	$1,521,420
Dairy Products Sold (1952 val.)	$638,541
Corn (1952 val.)	$450,000
Total Land Area (acres)	362,240
Forest Area (acres)	174,800
Population	(1940) 45,577; (1950) 46,356
Total Tax Val.	$40,700,000
Tax Rate	$1.65

Union County - In the southern Piedmont bordering South Carolina, Union is almost entirely agricultural. It has rolling, fertile land, with an elevation ranging between 500 and 700 feet, and a mile, dry climate. Gold, lead, and zinc occur in the westernmost portion, but little mining has been done. Blue clay is found near Monroe, and shale is scattered throughout the county. Chief merchantable species of trees are short-leaf pine, oak, and hickory. Waters in the Catawba River Basin include Cane, Waxhaw, Six Mile, and Twelve Mile Creeks.

A large per cent of the population is directly engaged in farming. Chief crops are cotton, grain, hay, lespedeza, oats, and wheat. The county is one of the leading poultry and egg producers in North Carolina. Livestock growing is also important. Industrial operations are small, the most important from the standpoint of employment being textile plants at Monroe. There are also lumber mills, roller mills, cottonseed-oil, cleaning and grading mills, and similar small enterprises.

Communities include Monroe (county seat), Marshallville, Waxhaw, Wingate, Houston, Mineral Springs, Indian Trail, Unionville, and Stouts.

Rainfall (inches)	46.01
Snowfall (inches)	4.4
Mean annual temperature (degrees)	62.0
Growing season (days)	193
Cotton	$3,750,000
Poultry and Turkeys	$3,500,000
Lespedeza	$1,750,000
Total Land Area (acres)	411,520
Forest Area (acres)	111,520
Population (1940)	39,097
Population (1950)	42,034
Total Tax Val.	$30,316,434
Tax Rate	$1.70

Watershed Boundaries - The boundary lines of the Broad and Catawba River Watersheds, in a clockwise direction, extend generally as follows:

Broad River Watershed Boundary - Beginning on Sandingstone Mountain at the intersection of the North Carolina-South Carolina State line and the Henderson-Transylvania County line;

Thence, along the crest of the Blue Ridge Mountains, successively through the peaks of The Pennacle No. 2, Ann, McAlpine, King, Piney, Point Lookout, Whiteside, Edneyville No. 1, Bearwallow, and Little Pisgah Mountains to Evans Knob on the Buncombe-McDowell County line about two miles south of Ridgecrest in Buncombe County;

Thence southeast, northeast, and south to Pinnacle Mountain, on the McDowell-Rutherford County line, through the peaks of Cross, Dutchman Ridge and Hickorynut Mountains;

Thence generally along the McDowell-Rutherford County line to its junction with the Burke-McDowell County line;

Thence successively along the Burke-Rutherford and Burke-Cleveland County lines to a point common to Burke, Catawba, Lincoln, and Cleveland Counties;

Thence easterly in Lincoln County along an unnumbered highway to its

junction with N. C. Highway No. 18;

Thence along N. C. Highway No. 18 to its intersection with N. C. Highway No. 10;

Thence along N. C. Highway No. 10 to its junction with N. C. Highway No. 274;

Thence southeast in Lincoln and Gaston Counties generally along N. C. Highway 274 to its junction with County Line Road;

Thence along County Line Road and generally along the Cleveland-Gaston County line to Kings Mountain in the southwestern corner of Gaston County;

Thence southwest to a point on the North Carolina-South Carolina State line about two miles west of the Cleveland-Gaston County line; and

Thence west along the North Carolina-South Carolina State line to the point of beginning. It should be understood that this part of the Broad River Watershed Boundary in North Carolina crosses the Broad River and several tributaries thereof which join the Broad River in South Carolina.

Catawba River Watershed Boundary - Beginning at a point on the North Carolina-South Carolina State Line about two miles west of the Cleveland-Gaston County line;

Thence along the Broad River Watershed Boundary, in the reverse order to that indicated above, to Evans Knob on the Buncombe-McDowell County line about two miles south of Ridgecrest in Buncombe County;

Thence successively along the Buncombe-McDowell, Yancey-McDowell, and Mitchell-McDowell County lines to U. S. Highway No. 221 in Avery County;

Thence northwest in Avery County generally along U. S. Highway No. 221 to Three Knobs Mountain;

Thence through Hawshore Mountain, Montezuma, and Linville Gap to Grandfather Mountain;

Thence along the Watauga-Caldwell County line to Blowing Rock;

Thence south and east in Caldwell County successively through Chestnut Mountain, Warrior Mountain, Indian Grave Gap, Moses Knob, and Cox Knob to Hickory Knob, a point common to Wilkes, Alexander, and Caldwell Counties;

Thence along the Wilkes-Alexander County line through Walnut Knob and Russell Gap to Kilby Gap;

Thence southeast in Alexander County through Round Top to Taylorsville;

Thence southeast in Alexander and Iredell Counties along an unnumbered highway to Troutmans in Iredell County;

Thence along U. S. Highway No. 21 in Iredell and Mecklenburg Counties, through Mooresville, Davidson, Cornelius, Caldwell, and Huntersville to a point about six miles north of Charlotte;

Thence in Mecklenburg County through Derita, Hickory Grove, Wilgrove,

Mint Hill, and Hood's to Matthews;

Thence southeast in Mecklenburg and Union Counties along an unnumbered highway to a point about one mile northwest of Bakers;

Thence south about 2.5 miles, east about 1.5 miles, and south about 2.5 miles to Houston;

Thence south along N. C. Highway No. 522 to the North Carolina-South Carolina State line; and

Thence along the North Carolina-South Carolina State line to the point of beginning. It should be understood that this part of the Catawba River Watershed Boundary in North Carolina crosses the Catawba River and several tributaries thereof which join the Catawba River in South Carolina.

Streams in the Broad and Catawba River Basins - There follows a list, alphabetically arranged, of streams in the Broad and Catawba River Basins, which are shown on available maps. There are a great number of streams, shown on such maps, the names of which are not indicated. There are shown, on the following lists, the stream into which each of the streams, alphabetically placed on the list, flows, and also the county in which the junction of the corresponding two streams is located. It is believed that these lists will be helpful to interested persons in quickly locating, on a county, topographical, or other map, any stream included in the lists, and also to trace the course of the stream throughout the basin in which it is located.

BROAD RIVER BASIN

STREAM	RECEIVING STREAM	COUNTY IN WHICH JUNCTION OCCURS
Adams Branch	Knob Creek	Cleveland
Bald Knob Creek	Little Knob Creek	Cleveland
Beason Creek	Buffalo Creek	Cleveland
Beaverdam Creek	First Broad River	Cleveland
Big Falls Creek	Pacolet River	Polk
Big Harris Creek	First Broad River	Cleveland
Bills Creek	Cove Creek	Rutherford
Blick Creek	Pacolet River	Polk
Boween River (Cleveland)	Broad River	Cherokee (S.C.)
Bracketts Creek	Floyds Creek	Rutherford
Brights Creek	Green River	Polk
Britten Creek	Green River	Polk
Broad River	Congaree River	Richland (S.C.)
Brushy Creek	First Broad River	Cleveland
Buck Creek	Broad River	Cleveland
Buffalo Creek (Cleveland)	Broad River	Cherokee (S.C.)
Camp Creek	Second Broad River	Rutherford
Cane Creek	Second Broad River	Rutherford
Catheys Creek	Second Broad River	Rutherford
Cedar Creek	Cove Creek	Rutherford
Cleghorn Creek	Broad River	Rutherford
Cove Creek	Broad River	Rutherford
Cove Creek	Green River	Polk
Crooked Run Creek	First Broad River	Cleveland
Dark Corner Creek	Pacolet River	Polk
Dixon Branch (Cleveland)	Kings Creek	Cherokee (S.C.)

Stream	Receiving Stream	County in Which Junction Occurs
Duncans Creek	First Broad River	Cleveland
First Broad River	Broad River	Cleveland
Floyds Creek	Broad River	Rutherford
Frog Creek	Camp Creek	Rutherford
Gilkey Creek	Mill Creek	Rutherford
Glenn Creek	Buffalo Creek	Cleveland
Grassy Branch	First Broad River	Cleveland
Green River	Broad River	Polk-Rutherford
Greens Creek	Whiteoak Creek	Polk
Grog Creek	Broad River	Cleveland
Hard Bargain Branch	Somey Creek	Rutherford
Harm Creek	Brights Creek	Polk
Heaveners Creek	Robinson Creek	Rutherford
Hickory Creek	First Broad River	Cleveland
Hills Creek	Second Broad River	Rutherford
Hinton Creek	First Broad River	Cleveland
Hog Pen Creek	Second Broad River	Rutherford
Hollands Creek	Catheys Creek	Rutherford
Hooper Creek (Polk)	Pacolet River	Spartanburg (S.C.)
Horse Creek	Pacolet River	Polk
Hughes Creek (Polk)	Pacolet River	Spartanburg (S.C.)
Hungry River	Green River	Henderson
Hunting Creek	Robinson Creek	Rutherford
Jarrells Creek	Broad River	Rutherford
Kelley Creek	Green River	Polk
Kings Creek (Cleveland)	Broad River	Cherokee (S.C.)
Knob Creek	Broad River	Rutherford
Knob Creek	First Broad River	Cleveland
Little Buffalo Creek	Buffalo Creek	Cleveland
Little Camp Creek	Camp Creek	Rutherford
Little Falls Creek	Big Falls Creek	Polk
Little Harris Creek	Big Harris Creek	Cleveland
Little Knob Creek	Knob Creek	Cleveland
Long Branch	Beason Creek	Cleveland
Machine Creek	Whiteoak Creek	Polk
Magness Creek	First Broad River	Cleveland
Maple Creek	First Broad River	Cleveland
Mayne Creek	Sandy Run Creek	Cleveland
McKinney Creek	Broad River	Rutherford
Mill Creek	Catheys Creek	Rutherford
Mill Creek	Whiteoak Creek	Polk
Morrow Creek	Second Broad River	Rutherford
Mountain Creek	Broad River	Rutherford
Muddy Fork	Potts Creek	Cleveland
North Fork	Sally Queen Creek	Rutherford
Ostin Creek	Green River	Polk
Pacolet River (Henderson)	Broad River	Cherokee-York (S.C.)
Persimmon Creek	Potts Creek	Cleveland
Potts Creek	Buffalo Creek	Cleveland
Puzzle Creek	Second Broad River	Rutherford
Reedy Patch Creek	Broad River	Henderson
Richland Creek	Broad River	Rutherford
Robinson Creek	Second Broad River	Rutherford
Rock Creek	Green River	Henderson
Sally Queen Creek	First Broad River	Rutherford
Sandy Run Creek	Broad River	Cleveland

Stream	Receiving Stream	County in Which Junction Occurs
Second Broad River	Broad River	Cleveland
Silver Creek	Green River	Polk
Skyuka Creek	Pacolet River	Polk
Somey Creek	First Broad River	Cleveland
Stoney Run Creek	First Broad River	Cleveland
Suck Creek	Broad River	Cleveland
Tumblebug Creek	Hungry River	Henderson
Upper Flat Creek	Broad River	Buncombe
Vaughn Creek	Pacolet River	Polk
Walnut Creek	Green River	Polk
Ward Creek	First Broad River	Cleveland
Wheat Creek	Green River	Polk
Whiteoak Creek	Buffalo Creek	Cleveland
Whiteoak Creek	Green River	Polk

CATAWBA RIVER BASIN

Abernathy Creek	Crowders Creek	Gaston
Abler Creek	Henry Fork Catawba River	Burke
Anderson Creek	Killian Creek	Lincoln
Anthony Creek	Johns River	Caldwell
Armstrong Creek	North Fork Catawba River	McDowell
Bailey Fork	Silver Creek	Burke
Bakers Creek	Lyle Creek	Catawba
Ball Creek	Catawba River	Catawba
Ballard Creek	Snyder Creek	Lincoln
Ballard Creek	Anderson Creek	Lincoln
Barr Creek	Davidson Creek	Iredell
Beaverdam Creek	South Fork Catawba River	Gaston
Big Branch	Elk Shoals Creek	Alexander
Billy Creek	Linville River	Avery
Blackwood Creek	Crowders Creek	Gaston
Boone Fork	Mulberry Creek	Caldwell
Border Creek	Catawba Creek	Lincoln
Briar Creek	Little Sugar Creek	Mecklenburg
Buck Creek	Catawba River	McDowell
Buffalo Creek	Catawba River	Iredell
Buffalo Shoals Creek	Catawba River	Iredell
Byers Creek	Davidsons Creek	Iredell
Camp Creek	Jacob Fork Catawba River	Burke
Cane Creek	Catawba River	McDowell
Cane Creek (Union)	Catawba River	York (S.C.)
Cane Creek	Zachs Creek	Caldwell
Canoe Creek	Catawba River	Burke
Carroll Creek	Johns River	Burke
Catawba Creek	Catawba River	Gaston
Catawba River	Wateree River	Kershaw (S.C.)
Cathey Creek	Davidsons Creek	Mecklenburg
Cedar Creek	Upper Little River	Caldwell
Celia Creek	Lower Creek	Caldwell
Clark Creek	South Fork Catawba River	Lincoln
Clear Creek	Catawba River	McDowell
Clear Creek	Silver Creek	Burke
Cline Creek	Clark Creek	Catawba
Coffey Branch	Sugar Creek	Mecklenburg

Stream	Receiving Stream	County in Which Junction Occurs
Cornelius Creek	Catawba River	Iredell
Cox Creek	Armstrong Creek	McDowell
Craig Creek	Wilson Creek	Caldwell
Cragg Prong	Wilson Creek	Caldwell
Crooked Creek	Catawba River	McDowell
Crowders Creek (Gaston)	Catawba River	York (S.C.)
Cub Creek	Henry Fork Catawba River	Burke
Cub Run Branch	Gunpowder Creek	Caldwell
Curtis Creek	Catawba River	McDowell
Davidsons Creek	Catawba River	Mecklenburg
Dellinger Branch	Leepers Creek	Lincoln
Drowning Creek	Catawba River	Burke
Duck Creek	Middle Little River	Alexander
Duharts Creek	South Fork Catawba River	Gaston
Dutchmans Creek	Stanley Creek	Gaston
East Fork	Twelve Mile Creek	Union
East Prong	Sandy Run Creek	Burke
Elk Shoal Creek	Catawba River	Catawba
Elk Shoals Creek	Catawba River	Alexander
Falling Creek	Catawba River	Burke
Fiddlers Run	Sandy Run Creek	Burke
Fites Creek	Catawba River	Gaston
Forney Creek	Killian Creek	Lincoln
Forsyth Creek	Catawba River	McDowell
Fourmile Creek	McAlpine Creek	Mecklenburg
Franklin Branch	Johns River	Caldwell
Gar Branch	Catawba River	Mecklenburg
Glade Creek	Lower Little River	Alexander
Glades Creek	Crooked Creek	McDowell
Goose Creek	Catawba River	McDowell
Grassy Creek	Lower Little River	Alexander
Greasy Creek	Lower Creek	Caldwell
Gum Branch	Long Creek	Mecklenburg
Gunpowder Creek	Catawba River	Caldwell
Gutter Branch	Long Creek	Mecklenburg
Hagan Creek	McLin Creek	Catawba
Hall Creek	Silver Creek	Burke
Harper Creek	Wilson Creek	Caldwell
Harris Creek	Tom Creek	McDowell
Henry Fork	South Fork Catawba River	Catawba
Hicks Creek	Catawba River	Iredell
Hildebran Creek	Clark Creek	Catawba
Hooper Branch	Anderson Creek	Lincoln
Hop Creek	Jacob Fork Catawba River	Catawba
Howards Creek	South Fork Catawba River	Gaston
Hoyles Creek	South Fork Catawba River	Gaston
Hunting Creek	Catawba River	Burke
Husband Creek	Celia Creek	Caldwell
Indian Creek	South Fork Catawba River	Lincoln
Irish Creek	Rose Creek	Burke
Irvins Creek	McAlpine Creek	Mecklenburg
Irwin Creek	Sugar Creek	Mecklenburg
Island Creek	Catawba River	Alexander
Jacob Fork	South Fork Catawba River	Catawba
Jarrett Creek	Catawba River	McDowell
Johns River	Catawba River	Burke

Stream	Receiving Stream	County in Which Junction Occurs
Karrs Branch	Hicks Creek	Iredell
Kennedy Creek	Irwin Creek	Mecklenburg
Killian Creek	Dutchmans Creek	Gaston
Kings Branch	Irwin Creek	Mecklenburg
Lambert Creek	Lower Little Creek	Alexander
Laurel Creek	Henry Fork	Burke
Leepers Creek	Dutchmans Creek	Gaston
Leonard Fork	Indian Creek	Lincoln
Lick Fork	Mill Creek	Lincoln
Lick Run	Leepers Creek	Lincoln
Linville River	Catawba River	Burke
Lippard Creek	Leepers Creek	Lincoln
Little Beaverdam Creek	Beaverdam Creek	Gaston
Little Buck Creek	Buck Creek	McDowell
Little Creek	Catawba River	Lincoln
Little Creek	Indian Creek	Lincoln
Little Crooked Creek	Crooked Creek	McDowell
Little Gunpowder Creek	Gunpowder Creek	Caldwell
Little Hoyles Creek	Hoyles Creek	Gaston
Little Indian Creek	Indian Creek	Lincoln
Little Long Creek	Long Creek	Gaston
Little River	Jacob Fork	Burke
Little Silver Creek	Silver Creek	Burke
Little Sugar Cr. (Meck.)	Sugar Creek	York (S.C.)
Little West Fork	Linville River	Avery
Long Creek	Catawba River	Mecklenburg
Long Creek	South Fork Catawba River	Gaston
Lower Creek	Catawba River	Caldwell
Lower Little River	Catawba River	Alexander
Lyle Creek	Catawba River	Catawba
Mackeys Creek	Catawba River	McDowell
Maiden Creek	Clark Creek	Catawba
Maple Swamp	Henry Fork	Burke
McAlpine Creek (Meck.)	Sugar Creek	York (S.C.)
McDowells Creek	Catawba River	Mecklenburg
McGaillard Creek	Catawba River	Burke
McIntyre Creek	Long Creek	Mecklenburg
McLin Creek	Catawba River	Catawba
McMullen Creek	McAlpine Creek	Mecklenburg
Middle Little Fork	Middle Little River	Alexander
Middle Little River	Catawba River	Alexander
Mill Creek	Catawba River	McDowell
Mill Creek	Indian Creek	Lincoln
Mill Timber Creek	Linville River	Avery
Morris Creek	Upper Little River	Caldwell
Mountain Creek	Catawba River	Alexander
Mountain Creek	Catawba River	Lincoln
Muddy Creek	Catawba River	Burke
Muddy Fork Creek	Lower Little River	Alexander
Mulberry Creek	Johns River	Caldwell
Mull Creek	Lyle Creek	Catawba
Naked Creek	Catawba River	Catawba
Nettle Branch	Jacob Fork	Burke
Newberry Creek	Curtis Creek	McDowell
Nicks Creek	Catawba River	McDowell
North Fork	Catawba River	McDowell

Stream	Receiving Stream	County in Which Junction Occurs
North Fork	Duck Creek	Alexander
North Fork Creek	Mountain Creek	Catawba
North Harper Creek	Harper Creek	Avery
North Muddy Creek	Muddy Creek	McDowell
Paddy Creek	Catawba River	Burke
Paw Creek	Catawba River	Mecklenburg
Pinch Gut Creek	Maiden Creek	Catawba
Pott Creek	South Fork Catawba River	Lincoln
Propst Creek	Catawba River	Burke
Ramsey Creek	Catawba River	Mecklenburg
Rattle Shoal Creek	South Fork Catawba River	Gaston
Reed Creek	Leepers Creek	Lincoln
Reed Creek	North Fork Mountain Creek	Catawba
Reeds Creek	Davidsons Creek	Mecklenburg
Rock Creek	Henry Fork	Burke
Rock Creek	Jacob Fork	Catawba
Rock Creek	Upper Little River	Caldwell
Rockdam Creek	Howards Creek	Lincoln
Rocky Creek	Catawba River	Iredell
Rose Creek	Warrior Fork Catawba River	Burke
Sandy Run Creek	Hunting Creek	Burke
Silver Creek	Catawba River	Burke
Silver Creek	Gunpowder Creek	Caldwell
Simpson Creek	Rose Creek	Burke
Sixmile Creek (Union)	Catawba River	Lancaster (S.C.)
Smoky Creek	Catawba River	Burke
Smoky Creek	Catawba River	Caldwell
Snow Creek	Catawba River	Catawba
Snyder Creek	Anderson Creek	Lincoln
South Creek	North Fork Creek	Catawba
South Crowders Creek	Crowders Creek	Gaston
South Fork	Nicks Creek	McDowell
South Fork	Catawba River	Gaston
South Harper Creek	Harper Creek	Avery
South Muddy Creek	Muddy Creek	McDowell
South Prong	Stanley Creek	Gaston
Spainhour Creek	Lower Creek	Caldwell
Spring Creek	Lower Little River	Alexander
Stafford Creek	Catawba River	Burke
Stanly Creek	Catawba River	Gaston
Steele Creek (Mecklenburg)	Catawba River	York (S.C.)
Steels Creek	Warrior Fork Catawba River	Alexander
Stewarts Creek	Sugar Creek	Mecklenburg
Stirewalt Creek	Lower Little River	Alexander
Stumpy Creek	Cornelius Creek	Iredell
Sugar Creek (Mecklenburg)	Catawba River	York (S.C.)
Swannanoa Creek	Mill Creek	McDowell
Three Mile Creek	Armstrong Creek	McDowell
Tims Creek	Henry Fork	Burke
Tom Creek	Catawba River	McDowell
Torrence Creek	McDowells Creek	Mecklenburg
Town Creek	Clark Creek	Catawba
Twelve Mile Creek (Union)	Catawba River	Lancaster (S.C.)
Upper Creek	Warrior Fork Catawba River	Burke
Upper Little River	Catawba River	Caldwell
Walker Branch	Clark Creek	Lincoln

Stream	Receiving Stream	County in Which Junction Occurs
Warrior Fork	Catawba River	Burke
Waxhaw Creek (Union)	Catawba River	Lancaster (S.C.)
West Fork	Twelve Mile Creek	Union
Whitener Creek	Rock Creek	Burke
Whiteoak Creek	Jacob Fork	Burke
Whites Mill Creek	Lower Creek	Burke
Wilson Creek	Johns River	Caldwell
Zacks Creek	Lower Creek	Caldwell

Descriptions and Chemical Character of Public Water Supplies - "Progress Report No. 1, Public Surface Water Supplies in North Carolina, U. S. Geological Survey, Raleigh, 1947", prepared in cooperation with the State Board of Health, contains the following information regarding public-water supplies in the Broad and Catawba River Basins. Ownership is municipal unless otherwise indicated.

Belmont, Gaston County

Population, 1940 - 4,356 (Population, 1950 - 4,330)
Supplies also about 1,000 people outside the city limits.
Ownership - Belmont Processing Company
Source - Catawba River
Treatment - Coagulation with alum and lime, chlorine, ammonia, rapid sand filtration, final adjustment of pH with soda ash.
Sample collected - March 8, 1946

Color	10	Bicarbonate	27
pH	7.0	Sulfate	6.4
Silica	9.0	Chloride	3.0
Iron	.07	Fluoride	.1
Manganese	.0	Nitrate	.4
Calcium	2.8	Dissolved solids	46
Magnesium	1.4	Total hardness	13
Sodium and potassium	9.6		

Bessemer City, Gaston County

Population, 1940 - 3,567 (Population, 1950 - 3,961)
Supplies also about 100 people outside of city limits.
Source - Long Creek impounded
Treatment - Coagulation with alum and soda ash, activated carbon, chlorine, rapid sand filtration.
Sample collected - June 10, 1946

Color	2	Bicarbonate	26
pH	7.2	Sulfate	23
Silica	7.5	Chloride	2.4
Iron	.03	Fluoride	.0
Manganese	.0	Nitrate	.2
Calcium	1.7	Dissolved solids	69
Magnesium	.9	Total hardness	8
Sodium and potassium	19		

Charlotte, Mecklenburg County

Population, 1940 - 100,899 (Population, 1950 - 134,042)
Source - Catawba River impounded
Treatment - Coagulation with alum and soda ash, ammonia, chlorine, activated carbon, rapid sand filtration, chlorine, final adjustment of pH with lime.
Sample collected - May 25, 1944

Color	2	Sodium and potassium	3.0	Dissolved solids	44
Silica	10	Bicarbonate	23		
Iron	.01	Sulfate	6.5	Total hardness	23
Manganese	0	Chloride	2.6		
Calcium	7.2	Fluoride	.0		
Magnesium	1.2	Nitrate	.4		

Cliffside, Rutherford County

Population, 1940 - about 2,000 (Population, 1950 - 1,388)
Ownership - Cliffside Mills
Source - Second Broad River impounded
Treatment - Coagulation with alum and soda ash, ammonia, chlorine, activated carbon, rapid sand filtration, final adjustment of pH with soda ash.
Sample collected - May 22, 1946

Color	2	Bicarbonate	39
pH	7.3	Sulfate	14
Silica	12	Chloride	3.0
Iron	.02	Fluoride	.0
Manganese	.0	Nitrate	.5
Calcium	3.7	Dissolved solids	70
Magnesium	1.6	Total hardness	16
Sodium and potassium	16		

Columbus, Polk County

Population, 1940 - 390 (Population, 1950 - 486)
Source - Horse Creek
Treatment - Slow sand filtration, chlorine.
Sample collected - January 17, 1947

Color	23	Bicarbonate	13
pH	7.1	Sulfate	2.1
Silica	11	Chloride	1.8
Iron	.14	Fluoride	.2
Manganese	.0	Nitrate	.0
Calcium	2.2	Dissolved solids	30
Magnesium	1.0	Total hardness	10
Sodium and potassium	2.9		

Davidson, Mecklenburg County

Population, 1940 - 1,550 (Population, 1950 - 2,423)
Supplies also about 1,450 people in Cornelius
Source - Cathey Creek impounded
Treatment - Coagulation with alum and soda ash, rapid sand filtration, chlorine, final adjustment of pH with lime.
Sample collected - May 29, 1946

Color	17	Bicarbonate	46
pH	7.3	Sulfate	21
Silica	16	Chloride	2.5
Iron	.22	Fluoride	.1
Manganese	.0	Nitrate	.2
Calcium	7.4	Dissolved solids	93
Magnesium	2.2	Total hardness	28
Sodium and potassium	17		

Drexel, Burke County

Population, 1940 - 881 (Population, 1950 - 988)
Supplies also about 200 people outside of city limits
Source - Propst Creek
Treatment: Coagulation with alum and soda ash, rapid sand filtration, hypochlorite.
Sample collected - May 23, 1946

Drexel continued

Color	2	Bicarbonate	16
pH	6.3	Sulfate	14
Silica	8.7	Chloride	1.0
Iron	.03	Fluoride	.0
Manganese	.02	Nitrate	.2
Calcium	2.4	Dissolved solids	44
Magnesium	1.0	Total hardness	10
Sodium and potassium	8.8		

Forest City, Rutherford County

Population, 1940 - 4,035 (Population, 1950 - 4,971)
Source - Bracketts Creek
Treatment - Coagulation with alum and lime, chlorine, rapid sand filtration, ammonia, final adjustment of pH with lime.
Sample collected - March 7, 1946

Color	3	Bicarbonate	16
pH	7.5	Sulfate	7.4
Silica	7.7	Chloride	2.1
Iron	.02	Fluoride	.0
Manganese	.02	Nitrate	.6
Calcium	5.7	Dissolved solids	37
Magnesium	1.2	Total hardness	19
Sodium and potassium	2.3		

Gastonia, Gaston County

Population, 1940 - 21,313 (Population, 1950 - 23,069)
Supplies also about 12,000 people outside of city limits, Lowell(Population, 1940: 1,825 - population, 1950: 2,313), and Dallas (Population, 1940: 1.700 - population, 1950: 2,454)
Source - Long Creek impounded
Treatment - Coagulation with alum, ammonia, chlorine, activated carbon, rapid sand filtration, chlorine, final adjustment of pH with lime.
Sample collected - April 28, 1944

Color	1	Bicarbonate	30
Silica	14	Sulfate	8.9
Iron	.02	Chloride	2.8
Manganese	0	Fluoride	.0
Calcium	9.0	Nitrate	.5
Magnesium	1.7	Dissolved solids	57
Sodium and potassium	4.0	Total hardness	29

Granite Falls, Caldwell County

Population, 1940 - 1,873 (Population, 1950 - 2,286)
Supplies also about 800 people outside of city limits
Source - Rhodhiss Lake (hydroelectric development)
Treatment - Coagulation with lime, rapid sand filtration, chlorine, ammonia, final adjustment of pH with lime.
Sample collected - September 23, 1946

Color	2	Calcium	7.1	Chloride	4.2
pH	7.6	Magnesium	1.1	Fluoride	.4
Silica	9.5	Sodium and potassium	6.5	Nitrate	.2
Iron	.02	Bicarbonate	27	Dis. solids	49
Manganese	.0	Sulfate	6.8	Total hardness	22

Hickory, Catawba County

Population, 1940 - 13,487 (Population 1950 - 14,755)
Supplies also about 1,000 people outside of city limits, Longview (population, 1940: 1,489 - population, 1950: 2,291), and Brookford (population, 1940: 910 - population, 1950: 768)
Source - Catawba River impounded in Lake Hickory
Treatment - Coagulation with alum and lime, chlorine, ammonia, rapid sand filtration, final adjustment of pH with lime.
Sample collected - February 18, 1946

Color	12	Bicarbonate	21
Silica	6.3	Sulfate	9.7
Iron	.46	Chloride	2.0
Manganese	.0	Fluoride	.0
Calcium	8.0	Nitrate	.8
Magnesium	1.0	Dissolved solids	42
Sodium and potassium	3.1	Total hardness	24

Kings Mountain, Cleveland County

Population, 1940 - 6,547 (Population, 1950 - 7,206)
Supplies also about 200 people outside of city limits
Source - Kings Creek impounded in City Lake
Treatment - Aeration, coagulation with alum and lime, rapid sand filtration, ammonia, chlorine, final adjustment of pH with lime.
Sample collected - March 20, 1946

Color	17	Bicarbonate	25
pH	7.7	Sulfate	8.8
Silica	5.0	Chloride	2.2
Iron	.33	Fluoride	.1
Manganese	.0	Nitrate	.3
Calcium	7.6	Dissolved solids	44
Magnesium	1.7	Total hardness	26
Sodium and potassium	3.4		

Lenoir, Caldwell County

Population, 1940 - 7,598 (Population, 1950 - 7,888)
Supplies also about 2,000 people outside of city limits
Source - Zacks Creek impounded
Treatment - Coagulation with alum, rapid sand filtration, chlorine, final adjustment of pH with lime.
Sample collected - December 12, 1946

Color	2	Bicarbonate	28
pH	0	Sulfate	5.3
Silica	16	Chloride	1.6
Iron	0.03	Fluoride	0.0
Manganese	0	Nitrate	0.1
Calcium	6.4	Dissolved solids	51
Magnesium	1.3	Total hardness	21
Sodium and potassium	4.4		

Lincolnton, Lincoln County

Population, 1940 - 4,525 (Population, 1950 - 5,423)
Supplies also about 6,000 people outside of city limits and about 2,000 people in Boger City - Goodsonville, unincorporated (population, 1950 - 1,733)

Lincolnton continued

Source - Walker Branch impounded
Treatment - Coagulation with alum, chlorine, final adjustment of pH with lime.
Sample collected - June 29, 1946

Color	5	Bicarbonate	20
pH	7.4	Sulfate	16
Silica	14	Chloride	2.6
Iron	.08	Fluoride	.1
Manganese	.0	Nitrate	1.0
Calcium	9.5	Dissolved solids	62
Magnesium	1.0	Total hardness	28
Sodium and potassium	4.6		

Marion, McDowell County

Population, 1940 - 2,889 (Population, 1950 - 2,740)
Supplies also about 500 people outside of city limits
Source - Mackeys Creek (75 percent) and Clear Creek (25 percent)
Treatment - Chlorine
Sample collected - August 29, 1946

Color	7	Bicarbonate	8.0
pH	7.1	Sulfate	1.1
Silica	7.4	Chloride	1.2
Iron	.02	Fluoride	.2
Manganese	.0	Nitrate	.1
Calcium	1.3	Dissolved solids	18
Magnesium	.6	Total hardness	6
Sodium and potassium	2.0		

Mooresville, Iredell County

Population, 1940 - 6,682 (Population, 1950 - 7,121)
Supplies also about 3,000 people outside of city limits
Source - Byers Creek
Treatment - Coagulation with alum, soda ash and/or lime, chlorine, rapid sand filtration, final adjustment of pH with lime.
Sample collected - April 24, 1946

Color	2	Bicarbonate	44
pH	7.9	Sulfate	11
Silica	20	Chloride	2.4
Iron	.02	Fluoride	.0
Manganese	.0	Nitrate	.1
Calcium	11	Dissolved solids	78
Magnesium	2.2	Total hardness	36
Sodium and potassium	6.7		

Morganton, Burke County

Population, 1940 - 7,670 (Population, 1950 - 8,311)
Supplies also about 2,000 people outside of city limits
Source - Henry Fork impounded
Treatment - Chlorine
Sample collected - April 19, 1946

Color	1	Bicarbonate	7.0
pH	6.5	Sulfate	2.3
Silica	5.6	Chloride	1.2
Iron	.07	Fluoride	.0

Morganton continued

Manganese	.0	Nitrate	.1
Calcium	1.3	Dissolved solids	19
Magnesium	.7	Total hardness	6
Sodium and potassium	1.7		

Mount Holly, Gaston County

Population, 1940 - 2,055 (Population, 1950 - 2241)
Supplies also about 3,000 people outside of city limits
Source - Catawba River
Treatment - Coagulation with alum, rapid sand filtration, chlorine, final adjustment of pH with soda ash.
Sample collected - June 10, 1946

Color	9	Bicarbonate	24
pH	5.5	Sulfate	7.6
Silica	9.4	Chloride	2.1
Iron	0.02	Fluoride	0.1
Manganese	0.0	Nitrate	0.2
Calcium	3.2	Dissolved solids	44
Magnesium	1.2	Total hardness	13
Sodium and potassium	8.3		

Newton, Catawba County

Population, 1940 - 5,407 (Population, 1950 - 6,039)
Source Hildebran Creek impounded (70 percent) and Jacob Fork (30 percent)
Treatment - Coagulation with alum and lime, rapid sand filtration, chlorine, ammonia, chlorine, final adjustment of pH with lime.
Sample collected - October 23, 1946

Color	2	Bicarbonate	36
pH	7.3	Sulfate	15
Silica	12	Chloride	2.5
Iron	12	Fluoride	0.2
Manganese	0.1	Nitrate	0.4
Calcium	13	Dissolved solids	69
Magnesium	2.3	Total hardness	42
Sodium and potassium	3.5		

Old Fort, McDowell County

Population, 1940 - 774 (Population, 1950 - 771)
Supplies also about 200 people outside of city limits
Source - Jarrett Creek
Treatment - Chlorine
Sample collected - December 5, 1943

Color	4	Bicarbonate	10
pH	0	Sulfate	2.5
Silica	6.8	Chloride	0.5
Iron	0.04	Fluoride	0.0
Manganese	0.0	Nitrate	0.0
Calcium	1.6	Dissolved solids	22
Magnesium	0.8	Total hardness	7
Sodium and potassium	1.9		

Riverbend (near Mount Holly), Gaston County

Population, 1940 - about 450
Ownership - Duke Power Company
Source - Catawba River
Treatment - Coagulation with alum and soda ash, chlorine, rapid sand filtration, final adjustment of pH with soda ash.
Sample collected - June 19, 1946

Color	6	Bicarbonate	113
pH	7.5	Sulfate	3.8
Silica	32	Chloride	3.0
Iron	0.1	Fluoride	0.2
Manganese	0.1	Nitrate	0.8
Calcium	20	Dissolved solids	138
Magnesium	5.5	Total hardness	72
Sodium and potassium	14		

Saluda, Polk County

Population, 1940 - 539 (Population, 1950 - 547)
Supplies also about 40 people outside of city limits
Source - Kelly Creek
Treatment - Coagulation with alum and lime, rapid sand filtration, chlorine.
Sample collected - August 30, 1946

Color	22	Bicarbonate	11
pH	7.0	Sulfate	1.8
Silica	9.3	Chloride	1.0
Iron	0.16	Fluoride	0.2
Manganese	0.0	Nitrate	0.2
Calcium	1.8	Dissolved solids	25
Magnesium	0.8	Total hardness	8
Sodium and potassium	2.4		

Shelby, Cleveland County

Population, 1940 - 14,037 (Population, 1950 - 14,508)
Supplies also about 300 people outside of city limits
Source - First Broad River impounded
Treatment - Coagulation with alum and lime, ammonia, chlorine, carbon, rapid sand filtration, final adjustment of pH with lime.
Sample collected - June 17, 1946

Color	3	Bicarbonate	27
pH	7.3	Sulfate	9.6
Silica	9.9	Chloride	3.8
Iron	0.02	Fluoride	0.1
Manganese	0.0	Nitrate	0.4
Calcium	7.3	Dissolved solids	56
Magnesium	1.1	Total hardness	23
Sodium and potassium	7.0		

Spindale, Rutherford County

Population, 1940 - 3,952 (Population, 1950 - 3,891)
Supplies also Ruth (population, 1940: 324 - population, 1950: 318), Rutherfordton (population, 1940: 2,326 - population, 1950: 3,146), and about 500 people outside of city limits
Ownership - Duke Power Company
Source - Catheys Creek

Spindale, continued

Treatment - Chlorine, coagulation with alum and lime, ammonia, rapid sand filtration, chlorine, final adjustment of pH with soda ash.
Sample collected - April 23, 1946

Color	10	Bicarbonate	35
pH	6.7	Sulfate	9.1
Silica	15	Chloride	2.6
Iron	0.04	Fluoride	0.0
Manganese	0.0	Nitrate	0.2
Calcium	6.8	Dissolved solids	61
Magnesium	1.5	Total hardness	23
Sodium and potassium	8.7		

Tryon, Polk County

Population, 1940 - 2,043 (Population, 1950 - 1,985)
Supplies also about 1,000 people outside of city limits
Source - Big Falls Creek impounded (60 percent), Little Falls Creek (30 percent), and Dark Corner Creek (10 percent)
Treatment - Coagulation with alum, rapid sand filtration, chlorine.
Sample collected - June 26, 1946

Color	3	Bicarbonate	13
pH	9.3	Sulfate	6.1
Silica	7.6	Chloride	2.0
Iron	0.05	Fluoride	0.1
Manganese	0.0	Nitrate	0.4
Calcium	2.7	Dissolved solids	32
Magnesium	0.6	Total hardness	9
Sodium and potassium	5.1		

The following material is taken from "Progress Report No. 2, Public Ground-Water Supplies in North Carolina, U. S. Geological Survey, Raleigh, 1949", prepared in cooperation with the North Carolina State Board of Health. Ownership is municipal unless otherwise indicated.

Alexander Mills, Rutherford County

Population, 1940 - 1,076 (population, 1950: 885)
Ownership - Alexander Manufacturing Company

Source	Well 1	Well 2	Well 3
Depth (ft.)	300	25	25
Diameter (in.)	6	2	2
Yield (g.p.m.)	45	40	40
Sample collected	5-25-48	5-25-48	5-25-48
Treatment	none	none	none
Color	2	2	1
pH	6.6	5.6	5.8
Silica	20	13	12
Iron	0.1	0.1	0.11
Manganese	0.0	0.0	0.0
Calcium	4.9	3.3	2.6
Magnesium	1.5	1.7	1.6
Na + K	4.1	3.8	3.2
Bicarbonate	26	13	18
Sulfate	2.2	1.4	1.2
Chloride	1.5	6.8	1.8

Alexander Mills continued

	Well 1	Well 2	Well 3
Fluoride	0.1	0.1	0.1
Nitrate	1.8	2.0	1.7
Dissolved solids	50	41	32
Total hardness	18	15	13

Bat Cave, Henderson County

Population - 10 (estimated)
Ownership - M. G. Conner
Source - Springs
Sample collected - November 12, 1946
Treatment - None

Color	3	Bicarbonate	22
pH	6.6	Sulfate	1.2
Silica	11	Chloride	1.4
Iron	0.06	Fluoride	0.1
Manganese	0.07	Nitrate	0.7
Calcium	2.4	Dissolved solids	35
Magnesium	0.6	Total hardness	8
Na + K	6.3		

Boiling Springs, Cleveland County

(Progress Report No. 2)
Population, 1940 - 613 (Population, 1950 - 1,145)

Source	Well 2	Well 3
Depth (ft.)	250	220
Diameter (in.)	8	8
Yield (g.p.m.)	125	50
Sample collected	9-16-47	9-16-47
Treatment	none	none
Color	14	30
pH	6.6	7.1
Silica	33	42
Iron	0.7	1.3
Manganese	0.0	0.0
Calcium	8.6	14
Magnesium	2.7	1.5
Na + K	8.6	13
Bicarbonate	48	71
Sulfate	8.4	8.4
Chloride	1.6	1.5
Fluoride	0.2	0.2
Nitrate	0.4	0.0
Dissolved solids	90	118
Total hardness	33	41

(Bulletin No. 68)

Type of well	Drilled	Drilled	Well I Drilled
Depth of casing (ft.)	100	75	110
Water level (ft.)	50	- -	50
Topography	Slope	- -	Slope
Depth of well (ft.)			357
Diameter of well (in.)			8
Yield (g.p.m.)			50
Remarks			Not used, pumps muddy water

Catawba, Catawba County

(Progress Report No. 2)

Population, 1940 - 402 (Population, 1950 - 506)

Source	Well 1	Well 2	Well 3
Depth (ft.)	360	285	351
Diameter (in.)	6	6	6
Yield (g.p.m.)	60	32	65
Sample collected	8-3-46	8-3-46	8-3-46
Treatment	none	none	none
Color	1	2	2
pH	6.6	6.8	6.7
Silica	38	35	34
Iron	0.1	0.13	0.14
Manganese	0.0	0.0	0.0
Calcium	7.8	8.7	17
Magnesium	1.9	3.6	5.8
Na+ K	9.7	7.1	10
Bicarbonate	35	53	55
Sulfate	2.7	1.3	3.7
Chloride	4.5	2.4	18
Fluoride	0.9	0.2	0.4
Nitrate	10	4	16
Dissolved solids	100	90	143
Total hardness	27	36	66

(Bulletin No. 68)

Date Completed	1933	1936	- -
Topography	flat	slope	slope
Depth of casing (ft.)	150	103	100
Water-bearing material	Granite gneiss	Granite gneiss	Granite gneiss
Water-level (ft.)	60	- -	35
Pumping level (ft.)	150	- -	150

Cherryville, Gaston County

Population, 1940 - 3,225, (Population, 1950 - 3,492)

Source	Well I	Well 3	Well 6	Well 7	Well 8	Well 9
Depth (ft.)	182	132	125	132	241	235
Diameter (in.)	5.6	5.6	5.6	8	8	8
Yield (g.p.m.)	15	18	20	40	55	35
Sample collected	2-16-48	2-16-48	2-16-48	2-16-48	2-16-48	2-16-48
Treatment	none	none	none	none	none	none
Color	2	3	3	2	2	2
pH	6.4	6.2	6.4	6.6	7.2	6.4
Silica	35	35	32	36	27	29
Iron	0.15	0.59	0.4	0.08	8.6	0.16
Manganese	0.0	0.0	0.0	0.0	0.1	0.0
Calcium	4.4	4.5	2.9	6.2	5.9	2.9
Na + K	8.3	6.9	6.8	5.2	9.3	7.6
Bicarbonate	40	37	31	52	84	40
Sulfate	1.9	2.9	1.6	3.9	4.1	5.3
Chloride	13	8.4	5.8	7.4	4.5	3.1
Fluoride	0.0	0.0	0.0	0.0	0.0	0.0
Nitrate	10	14	10	8.8	0.0	8.0
Dissolved solids	111	107	90	114	107	92
Total hardness	43	41	28	53	59	33

Chimney Rock, Rutherford County

Population	25 (estimated)	
Ownership	Chimney Rock Company	
Source	Spring	
Sample collected	9-20-49 (raw water)	9-20-49 (treated water)
Treatment	Chlorination	
Color	2	2
pH	5.9	6.1
Silica	11	12
Iron	0.01	0.01
Manganese	0.0	0.06
Calcium	2.0	3.0
Magnesium	0.6	0.6
Na + K	2.4	1.8
Bicarbonate	9	10
Sulfate	1.8	1.9
Chloride	1.9	2.1
Fluoride	0.0	0.0
Nitrate	0.9	0.8
Dissolved solids	28	28
Total hardness	7	10

Chimney Rock Village, Rutherford County

Population - 50 (estimated)
Ownership - J. W. Price and C. Dalton
Source - Parker and Laughter Springs
Sample collected - June 23, 1947
Treatment - chlorination

Color	2	Bicarbonate	16
pH	6.1	Sulfate	1.5
Silica	13	Chloride	2.0
Iron	0.0	Fluoride	0.3
Manganese	0.0	Nitrate	0.7
Calcium	2.0	Dissolved solids	33
Magnesium	0.6	Total hardness	7
Na + K	5.2		

Conover, Catawba County

Population, 1940 - 1,195 (Population, 1950 - 1,164)

Source	Well 1	Well 2
Depth (ft.)	600	535
Diameter (in.)	6	6
Yield (g.p.m.)	75	40
Sample collected	12-2-46	12-2-46
Treatment	Chlorination	Chlorination
Color	4	3
pH	7.1	6.6
Silica	30	24
Iron	0.17	0.09
Manganese	0.13	0.0
Calcium	22	20
Magnesium	3.8	3.0
Na + K	3.8	3.0
Bicarbonate	88	74
Sulfate	11	13

Conover continued

	Well 1	Well 2
Chlorine	2.0	1.8
Fluoride	0.2	0.1
Nitrate	0.1	0.1
Dissolved solids	120	106
Total hardness	70	62

(For data on Wells 3, 4, and 5, see material hereinafter which was taken from Bulletin No. 68)

Crossnore, Avery County

Population: 1940 - 266 (Population, 1950 - 240)

Ownership	Crossnore School, Inc.		
Source	well		
Depth (ft.)	186		
Diameter (in.)	6		
Yield (g.p.m.)	70		
Sample Collected	11-4-47		
Treatment	none		
Color	5		
pH	6.6	Bicarbonate	28
Silica	18	Sulfate	2.3
Iron	0.15	Chloride	1.9
Manganese	0.0	Fluoride	0.0
Calcium	5.2	Nitrate	3.0
Magnesium	1.0	Dissolved solids	58
Na + K	6.2	Total hardness	17

Glen Alpine, Burke County

Population, 1940 - 665 (Population, 1950 - 695)

Source	Well		
Depth (ft.)	317	Calcium	10
Diameter (in.)	8	Magnesium	2.8
Yield (g.p.m.)	75	Na + K	9.5
Sample collected	3-19-47	Bicarbonate	63
Treatment	none	Sulfate	1.4
Color	3	Chloride	2.2
pH	7.3	Fluoride	0.1
Silica	26	Nitrate	0.9
Iron	0.05	Dissolved Solids	84
Manganese	0.0	Total hardness	36

Grover, Cleveland County

Population, 1940 - 469 (Population, 1950 - 535)

Ownership	Minette Mills, N. C.	
Source	Well 1	Well 2
Depth (ft.)	84	50
Diameter (in.)	8	8
Yield (g.p.m.)	60	60
Sample collected	7-23-47	7-23-47
Treatment	none	none
Color	4	7

Grover continued

	Well 1	Well 2
pH	5.3	7.1
Silica	24	25
Iron	0.05	0.38
Manganese	0.0	0.7
Calcium	4.2	6.6
Magnesium	1.4	2.4
Na + K	26	68
Bicarbonate	12	17
Sulfate	1.0	1.4
Chloride	34	107
Fluoride	0.1	0.1
Nitrate	17	10
Dissolved solids	147	242
Total hardness	16	26

Huntersville, Mecklenburg County

Population, 1940 - 763 (Population, 1950 - 916)

Source	Well 1	Well 2	Well 3	Well 4	Well 5
Depth (ft.)	60	180	96	197	300
Diameter (in.)	8	8	5	5	10
Yield (g.p.m.)	9	14	9	18	20
Sample collected	10-13-48	10-13-48	10-13-48	10-13-48	10-13-48
Treatment	none	none	none	none	none
Color	3	2	2	1	2
pH	6.8	7.1	7.0	7.0	7.3
Silica	44	39	40	33	30
Iron	0.50	0.32	0.12	0.06	1.2
Manganese	0.0	0.0	0.0	0.0	0.0
Calcium	13	18	14	16	29
Magnesium	5.3	7.5	5.9	5.8	5.1
Na + K	5.8	4.9	4.3	5.4	8.3
Bicarbonate	69	90	73	71	76
Sulfate	2.6	4.4	3.0	3.7	39
Chloride	3.1	4.1	3.0	4.5	4.0
Fluoride	0.1	0.0	0.0	0.0	0.1
Nitrate	3.8	2.7	1.7	8.8	3.3
Dissolved solids	114	132	113	117	160
Total hardness	54	76	59	64	93

Lake Lure, Rutherford County

Population, 1940 - 212 (Population, 1950 - 174)

Source	Well		
Depth (ft.)	124		
Diameter (in.)	6		
Yield (g.p.m.)	50	Magnesium	3.1
Sample collected	2-4-49	Na + K	8.3
Treatment	Chlorination	Bicarbonate	50
Color	3	Sulfate	15
pH	7.0	Chloride	2.1
Silica	24	Fluoride	0.4
Iron	0.04	Nitrate	0.4
Manganese	0.0	Dissolved solids	89
Calcium	12	Total hardness	43

Lawndale, Cleveland County

Population, 1940 - 1,006 (Population, 1950 - 964)
Ownership - Cleveland Mill and Power Company

Source	Well 1	Well 2
Depth (ft.)	150	150
Diameter (in.)	6	6
Yield (g.p.m.)	30	30
Sample collected	12-8-48	12-8-48
Treatment	none	none
Color	2	2
pH	6.0	6.5
Silica	14	19
Iron	0.21	0.1
Manganese	0.0	0.0
Calcium	6	18
Magnesium	2.3	3.2
Na + K	5.3	13
Bicarbonate	20	45
Sulfate	3.4	23
Chloride	7	17
Fluoride	0.0	0.0
Nitrate	7.5	2.2
Dissolved solids	58	123
Total hardness	24	58

Linville, Avery County

Population - 300 (estimated)
Ownership - Linville Resorts, Inc.

Source	Well		
Depth (ft.)	245	Calcium	5.6
Diameter (in.)	10	Magnesium	0.9
Yield (g.p.m.)	60	Na + K	2.2
Sample collected	9-14-48	Bicarbonate	22
Treatment	none	Sulfate	0.8
Color	2	Chloride	1.0
pH	6.8	Fluoride	0.1
Silica	14	Nitrate	2.4
Iron	0.19	Dissolved solids	39
Manganese	0.0	Total hardness	18

Little Switzerland, McDowell County

Population - 250 (estimated)
Ownership - Switzerland Co.

Source	Springs		
Sample collected	7-11-49		
Treatment	none		
Color	3		
pH	6	Bicarbonate	9
Silica	7.6	Sulfate	0.9
Iron	0.05	Chloride	1.0
Manganese	0.0	Fluoride	0.0
Calcium	2.0	Nitrate	1.1
Magnesium	0.3	Dissolved solids	18
Na + K	2.0	Total hardness	6

Maiden, Catawba County

(Progress Report No. 2)

Population, 1940 - 1,803 (Population, 1950 - 1,952)

Source	Well 2	Well 5	Well 6	Well 7
Depth (ft.)	80	100	165	535
Diameter (in.)	6	6	6	8
Yield (g.p.m.)	60	60	30	30
Sample collected	10-28-47	10-28-47	10-28-47	10-28-47
Treatment	none	none	none	none
Color	0	2	2	3
pH	6.7	7.0	7.4	7.5
Silica	30	28	32	33
Iron	0.06	0.06	0.06	0.11
Manganese	0.0	0.0	0.03	0.0
Calcium	9.6	10	14	8.6
Magnesium	3.6	3.4	4.2	3.4
Na + K	5.7	5.6	8.0	4.5
Bicarbonate	48	49	74	49
Sulfate	1.7	1.9	3.4	2.2
Chloride	3.0	2.5	2.6	1.1
Fluoride	0.1	0.1	0.1	0.0
Nitrate	6.9	6.5	1.9	1.4
Dissolved solids	86	88	106	79
Total hardness	39	39	52	35

(Bulletin No. 68)

Topography	Valley	Valley	Slope	Slope
Depth of casing (ft.)	75	- -	- -	84
Water-bearing material	Hornblend gneiss	Hornblende gneiss	Hornblende gneiss	Hornblende gneiss
Water-level (ft.)	15	15	18	20
Pumping level (ft.)	65	70	120	140

(For data regarding Wells 1, 3, and 4, see material hereinafter under "Other Date pertaining to Public Water Supplies".)

Pineola, Avery County

Population - 40 (estimated)
Ownership - Nellie Phillips

Source	Spring		
Sample Collected	12-14-46 (treated water)		
Treatment	Chlorination		
Color	4		
pH	5.4	Bicarbonate	8
Silica	5.9	Sulfate	1.0
Iron	0.03	Chloride	4.0
Manganese	0.0	Fluoride	0.1
Calcium	0.6	Nitrate	0.3
Magnesium	0.3	Dissolved solids	21
Na + K	5.1	Total hardness	3

Pineville, Mecklenburg County

Population, 1940 - 1,144 (Population, 1950 - 1,373)

Source	Well		
Depth (ft.)	134	Calcium	55
Diameter (in.)	8	Magnesium	26
Yield (g.p.m.)	75	Na + K	20
Sample collected	6-25-47	Bicarbonate	185
Treatment	none	Sulfate	94
Color	3	Chloride	22
pH	6.7	Fluoride	0.5
Silica	60	Nitrate	6.0
Iron	0.09	Dissolved solids	395
Manganese	0.0	Total hardness	244

Rhodhiss (Burke County-Caldwell County)

Population, 1940 - 930 (Population, 1950 - 923)

Source	Well 3 (10%)		Well 4 (65%)		Well 5 (25%)
Ownership	Pacific Mills Co.		Municipal		Municipal
Depth (ft.)	155		386		846
Diameter (in.)	6		8-10		8-10
Yield (g.p.m.)	24		105		35
	Well 3	Well 4 (raw water)	Well 5 (raw water)	Well 4 (treated water)	Well 5 (treated water)
Sample collected	1-3-49	8-31-49	8-31-49	8-31-49	12-8-49
Treatment	none	none	none	Chlorination & calgon	Chlorination & calgon
Color	3	2	2	3	2
pH	6.8	7.9	6.7	7.7	6.4
Silica	16	30	14	31	13
Iron	0.22	0.19	0.29	0.16	1.7
Manganese	0.0	0.05	0.05	0.06	0.0
Calcium	9.2	16	11	17	8.0
Magnesium	2.1	1.5	1.6	1.7	1.6
Na + K	4.1	8.5	6.1	8.3	4.2
Bicarbonate	40	66	45	68	27
Sulfate	5.5	8.5	5.2	8.3	4.3
Chloride	1.1	1.1	3.1	2.0	4.8
Fluoride	0.1	0.0	0.0	0.1	0.3
Nitrate	1.1	1.1	0.9	0.1	1.9
Dissolved solids	58	98	65	101	52
Total hardness	32	46	34	49	27

Saluda, Polk County

Population, 1940 - 539 (Population, 1950 - 547)

Source - Heatherly Heights Springs. Surface Water (Cove Creek) used as an auxiliary supply.

Sample collected	1-9-47 (treated water)				
Treatment	Chlorination and alum				
Color	12	Magnesium	0.6	Nitrate	0.0
pH	6.7	Na + K	2.3	Dissolved solids	19
Silica	8.3	Bicarbonate	0.8	Total hardness	5
Iron	0.04	Sulfate	1.8		
Manganese	0.0	Chloride	1.0		
Calcium	1.0	Fluoride	0.1		

Stanley, Gaston County

Population, 1940 - 1,036 (Population, 1950 - 1,644)

Source	Well 1	Well 2	Well 3	Well 4
Depth (ft.)	350	550	350	350
Diameter (in.)	8	8	8	8
Yield (g.p.m.)	45	27	15	20
Sample collected	11-20-47	11-20-47	11-20-47	11-20-47
Treatment	none	none	none	none
Color	0	6	3	5
pH	7.9	7.5	5.9	7.1
Silica	32	20	21	31
Iron	0.23	4.9	2.8	0.41
Manganese	0.0	0.0	0.0	0.0
Calcium	44	31	3.0	55
Magnesium	3.7	5.0	0.7	5.1
Na + K	11	8.4	8.0	25
Bicarbonate	160	124	12	107
Sulfate	6.7	10	1.1	113
Chloride	7.0	2.5	7.6	2.2
Fluoride	0.3	0.2	0.1	1.0
Nitrate	0.6	0.0	7.4	1.1
Dissolved solids	186	138	60	290
Total hardness	125	98	10	158

Taylorsville, Alexander County

Population, 1940 - 1,122 (Population, 1950 - 1,310)

Source	Well 3	Well 4
Depth (ft.)	503	303
Diameter (in.)	8	10
Yield (g.p.m.)	25	325
Sample collected	10-24-46	10-24-46
Treatment	none	none
Color	3	3
pH	6.6	6.8
Silica	31	28
Iron	1.3	0.16
Manganese	0.14	0.06
Calcium	14	16
Magnesium	2.2	1.6
Na + K	8.5	9.6
Bicarbonate	56	56
Sulfate	13	16
Chloride	1.8	3.0
Fluoride	0.2	0.1
Nitrate	0.0	0.3
Dissolved solids	102	105
Total hardness	44	46

Troutman, Iredell County

Population, 1940 - 566 (Population, 1950 - 613)

Source	Well 1	Well 2
Depth (ft.)	275	558
Diameter (in.)	8	8
Yield (g.p.m.)	20	38
Sample collected	9-24-48	9-24-48

Troutman continued

	Well 1	Well 2
Treatment	none	none
Color	2	2
pH	6.6	6.5
Silica	31	24
Iron	1.7	0.13
Manganese	0.07	0.02
Calcium	7.6	11
Magnesium	3.1	4.0
Na + K	10	4.7
Bicarbonate	44	55
Sulfate	9.8	1.5
Chloride	5.2	3.0
Fluoride	0.1	0.0
Nitrate	0.1	4.0
Dissolved solids	93	84
Total hardness	32	44

Waxhaw, Union County

Population, 1940 - 611 (Population, 1950 - 818)

Source	Well 1	Well 2
Depth (ft.)	250	200
Diameter (in.)	8	8
Yield (g.p.m.)	50	40
Sample collected	7-25-49	7-25-49
Treatment	none	none
Color	4	3
pH	616	614
Silica	35	44
Iron	0.27	0.58
Manganese	0.00	0.00
Calcium	11	13
Magnesium	4.2	4.5
Na + K	9.5	12
Bicarbonate	69	63
Sulfate	3.5	1.8
Chloride	3.0	15
Fluoride	0.2	0.1
Nitrate	0.3	1.9
Dissolved solids	100	132
Total hardness	45	51

Other data pertaining to Public Water Supplies - "Bulletins Nos. 63 and 68", published by the North Carolina Department of Conservation and Development and prepared cooperatively by the Geological Survey, U. S. Department of the Interior, contain information regarding public water supplies in the Broad and Catawba River Basins as follows:

Claremont, Catawba County

Population, 1940 - 467 (Population, 1950 - 669)

Source	Well 1	Well 2	Well 3
Topographical location	Slope	Hill	Hill
Depth of well (ft.)	350	500	600
Diameter (in.)	6	6	- -
Depth of casing (ft.)	60	50	60

Claremont continued

	Well 1	Well 2	Well 3
Waterbearing material	Hornblende gneiss	Hornblende gneiss	Granite gneiss
Water level (ft.)	30	50	50
Pumping level (ft.)	150	150	- -
Yield (g.p.m.)	45	90	7

Conover, Catawba County

Population, 1940 - 1,195 (Population, 1950 0 1,164)

Source	Well 3	Well 4	Well 5
Date completed	1938	1951	1947
Topographical location	Hill	Draw	Valley
Depth of well (ft.)	1200	406	264
Diameter (in.)	- -	8	10
Depth of casing (ft.)	- -	44	82
Water-bearing material	Hornblende gneiss	Hornblende gneiss	Hornblende gneiss
Water level (ft.)	- -	28	4
Yield (g.p.m.)	7	228	47
Pumping level (ft.)	- -	190	225

(For date on Wells 1 and 2, see material hereinbefore which was taken from Progress Report No. 2)

Hickory, Catawba County

Population, 1940 - 13,487 (Population, 1950 - 14,755)

Source	Well
Date completed	1950
Topographical location	Slope
Depth of well (ft.)	120
Diameter (in.)	6
Water-bearing material	Granite gneiss
Water level (ft.)	2
Yield (g.p.m.)	20
Temperature	59° F.
Pumping level	120

Lincolnton, Lincoln County

Population, 1940 - 4,525 (Population, 1950 - 5,423)

Source	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6
Type	Drilled	Drilled	Drilled	Drilled	Drilled	Drilled
Depth (ft.)	184	150	150	142	175	175
Diameter (in.)	8	6	6	6	6	6
Water level (feet below surface)	10.88	5.55		5.01	8	8
Yield (g.p.m.)						
Character of material	Granite					
Temperature					59° F.	59° F.
Topographical location					Valley	Valley

Maiden, Catawba County

Population, 1940 - 1,803 (Population, 1950 - 1,952)

Source	Well 1	Well 3	Well 4
Date completed	- -	1951	1948
Topography	Valley	Hill	Slope
Depth of well (ft.)	252	200	245

Maiden continued

	Well 1	Well 3	Well 4
Diameter (in.)	6	6	8
Depth of casing (ft.)	- -	77	75
Water-bearing material	Hornblende gneiss	Hornblende gneiss	Hornblende gneiss
Water-level (ft.)	18	50	- -
Yield (g.p.m.)	30	57	6
Pumping level (ft.)	110	140	193

Matthews, Mecklenburg County

Population, 1940 - 486 (Population, 1950 - 589)	
Source	Well
Type	Drilled
Depth of Well (ft.)	275
Diameter (in.)	6
Depth of casing (ft.)	110
Yield (g.p.m.)	20
Character of material	Greenstone
Topographical location	Slope

McAdenville, Gaston County

This municipality (Population, 1940: 887 - population, 1950: 1,060) is supplied with water from one of three wells owned by Stowe Mills, Inc. (see Chapter IV hereinafter). The well is 523 feet deep and yields in excess of 100 gallons a minute. A field test showed that the water had a total hardness of 230 parts per million. The water is not treated.

Mooresville, Iredell County

Population, 1940 - 6,682 (Population, 1950 0 7,121)	
Source	Well
Topographic location	Slope
Depth (ft.)	400
Diameter (ft.)	6
Water-bearing material	Granite
Water level (ft.)	25
Yield (g.p.m.)	80
Drawndown (ft.)	100
Remarks	Well abandoned

Waco, Cleveland County

Population, 1940 - 281 (Population, 1950 - 310)	
Source	Well
Type	Core drilled
Depth of well (ft.)	110
Diameter of well(in.)	3
Yield (g.p.m.)	9
Total hardness	40
Character of material	Schist
Topographic location	Slope

Data regarding Agricultural Production - Information regarding farm population, total land in farms, harvested croplands, idle cropland, and use of fertilizers, according to the 1952 Farm Census of 1951 crops for the counties within or partially within the Broad and Catawba River Basins, is shown below. The figures shown in the tables below are in acres, unless otherwise indicated.

ITEM	Alexander County	Avery County	Burke County	Caldwell County	Catawba County	Cleveland County	Gaston County	Lincoln County	McDowell County	Mecklenburg County	Polk County	Rutherford County	Union County	Total for Counties in Broad and Catawba River Basins
Harvested Cropland	30,031	14,221		23,151	69,845	126,407	44,580	62,669	12,889	65,289	16,313	53,887	131,724	* 651,506
Idle Cropland	14,530	2,818		13,825	25,104	23,104	29,928	14,238	5,879	24,139	9,861	35,050	18,799	* 217,275
Pasture	15,469	24,273		16,181	26,113	32,293	22,157	20,258	11,289	38,706	11,146	31,892	52,187	* 301,964
Woods, Home-Sites, etc.	78,669	48,844		103,763	97,416	90,511	86,470	75,964	76,185	96,370	52,163	133,348	176,003	*1,115,306
Corn Harvested	7,223	1,747		7,059	13,729	25,916	11,358	13,510	4,985	14,085	6,508	20,391	32,499	* 159,010
Cotton Harvested	958			49	3,648	47,217	5,119	11,030		12,843	1,321	8,457	27,708	* 118,350
Tobacco Harvested	2,015	111		619	14	13	2		11		1	36	- -	* 2,822
Peanuts	37			18	115	60	40	42	2	21	15	187	- -	* 537
Wheat	5,181	47		2,472	16,153	18,874	9,512	16,197	1,123	7,982	1,140	6,022	17,765	* 102,468
Oats	4,525	564		1,708	9,837	12,125	7,892	8,963	413	10,942	1,031	4,405	31,473	* 93,878
Other Small Grains	895	290		761	1,775	3,466	1,905	3,190	296	984	207	945	6,670	* 21,384
Soybeans	884	10		1,391	2,475	336	179	360	1,478	321	52	1,097	806	* 9,389
Lespedeza	1,126			554	5,762	3,357	2,031	3,786	494	1,524	64	373	31,999	* 51,070
Hay Crops Harvested	7,634	352		5,438	19,403	23,844	8,154	14,189	1,555	17,941	2,854	9,891	12,532	* 123,787
Other Hays Cut	354	8,163		1,783	1,056	874	650	672	910	1,324	548	1,261	994	* 18,589
Irish Potatoes	124	884		291	122	396	52	48	167	70	50	231	225	* 2,660
Sweet Potatoes	50	23		79	553	487	105	113	61	104	152	480	242	* 2,449
Other Vegetables Grown	68	999		201	313	365	291	313	59	706	300	1,069	782	* 5,466
Other Crops Harvested	3,165	1,226		2,050	3,051	4,440	1,801	2,767	1,322	1,972	1,361	3,071	3,394	* 29,620
Total Land in Farms	138,699	90,156		156,920	218,478	272,315	176,135	173,129	106,242	224,504	89,983	259,177	378,713	*2,284,450
Total Land Area	163,200	158,080	323,840	304,640	259,840	298,240	229,120	197,120	205,600	346,880	149,760	174,800	411,150	3,222,270
Comm. Fert. Used, Tons	5,080	2,231		3,095	10,419	29,841	7,446	10,897	1,349	9,972	3,000	9,606	23,662	* 116,078
Sows and Gilts, No.	223	107		393	630	887	516	231	163	522	100	477	1,683	* 5,932
Cows and Heifers, No.	3,947	3,342		3,817	6,954	10,399	6,020	5,826	1,927	9,237	1,632	5,079	10,293	* 68,073
Tractors in Usable Condition, No.	597	37		559	1,080	1,683	834	1,143	220	1,148	184	690	1,827	* 10,002
Farm Population, No.	9,400	7,745		15,592	16,381	25,397	13,098	13,966	7,524	15,849	5,083	17,240	23,562	* 170,037
Total Population, 1950, No.	14,554	13,352	45,518	43,352	61,794	64,357	110,836	27,459	25,720	197,052	11,627	46,356	42,034	704,011

Data not published

Data not published

* Less Burke County

Permits to Use Water for Irrigation - The following permits to use surface waters in the Broad and Catawba River Basins for the purpose of irrigation have be been issued by the Director of the Department of Conservation and Development in accordance with the provisions of Section 113-8.1, General Statutes of North Carolina, as amended:

Permit Number	Name	Address	Source	Amount c.f.s.
		Alexander County		
35	Mrs. S. E. Little	Box 295, Taylorsville	Br. of Glade Creek	0.54
		Burke County		
148	State Hospital	Morganton	Catawba River	1.96
147	State Hospital	Morganton	Hunting Creek	0.58
653	O. H. Fowler	Box 446, Morganton	Henry Fork	0.57
652	Wade Goodman	R#2, Morganton	Br. of Rose Creek	0.53
451	Dr. G.T. Cornwell	Cornwell Drug Co., Morganton	Silver Creek	0.20
787	Forestry Div.,C&D	Ed. Bldg.,Raleigh	Catawba River	0.89
791	Conley W. Brendle	Box 214,R#6,Morganton	Fiddlers Cr.	0.44
		Caldwell County		
302	R. M. Barlow	R#1, Lenoir	Cane Cr.	0.14
654	J. H. Jett	R#2, Granite Falls	Cane Cr.	0.76
58	H. C. Adair	Box 192,R#2,Lenoir	Middle Little River	0.25
195	B. G. Looper	R#2,Granite Falls	Mill Creek	0.51
584	J. H. Richards	R#2,Granite Falls	Cub Run Br.	0.18
655	Bowman Bros.	Granite Falls	Br. of Rock Cr.	0.35
821	J. C. Satterwhite	R#1, Granite Falls	Little River	0.16
822	C. P. Satterwhite	R#1, Granite Falls	Little River	0.16
		Catawba County		
40	C. H. Herman	Conover	Lyles Cr.	1.00
273	G. R. Herman	Box 306 Conover	Br. of Lyles Cr.	0.43
38	H. F. Wallace	Box 228, R#1, Hickory	Whitener Spring	0.14
39	H. F. Wallace	Box 228, R#1, Hickory	Br. of Hop Cr.	0.40
121	C. L. Whisnant	Box 15, Hickory	S. Fk. Catawba R.	4.50
		Cleveland County		
127	Falls Farm	R#3, Lawndale	Knobb Cr.	2.23
596	Brady Dellenger	R#2, Lawndale	Glenn Cr. & Buffalo Cr.	0.37
428	A.A. Lackey, Jr.	Box 234,Fallston	Long Branch	0.54
249	C. L. Gold	R#1, Shelby	Buffalo Cr.	1.34
55	E. A. Hamrick	Box 102, Shelby	Br. of First Broad R.	1.43
54	Willie Wilson	R#1, Shelby	Hickory Cr.	0.84
27	M. S. Roberts	R#3,Kings Mountain	Potts Creek	0.35
417	F. E. Hamrick	Boiling Springs	Beaver Dam Creek	0.90
183	G. A. Adams	R#4, Shelby	Beaver Dam Creek	1.18
182	John Wortman	R#4, Shelby	Little Beaver Dam Cr.	1.25
438	J. B. Roberts	R#3, Shelby	Yancey Cr.	0.19
718	Lee Lewis	Fallston	Br. of Maple Cr.	0.81
724	O. C. Wilson	Box 668, Shelby	Br. of Hickory Cr.	0.85
772	D. S. Sellers	R#3, Kings Mountain	Br. of Persimmon Cr.	0.30

Gaston County

28	R. B. Hoffman	Box 481, Stanley	S. Fk. Catawba R.	0.46
681	F. A. Rankin	R#2, Gastonia	S. Fk. Catawba R.	1.07
793	Paul E. Rhyne	R#2, Dallas	Hoyles Cr.	0.25
794	Paul E. Rhyne	R#2, Dallas	S. Fk. Catawba R.	0.25
832	H. E. Dellenger	Box 228, R#2, Cherryville	Br. of Muddy Cr.	0.13

Henderson County

781	Lowell M. Hill	R#1, Flat Rock	Tumblebug Cr.	1.62
782	Lowell M. Hill	R#1, Vlat Rock	Hungry R.	1.62
817	Donald G. Ward, Jr.	Dana	Tumblebug Cr.	2.12

Iredell County

115	B. C. Smith	R#1, Troutmans	Br. of Karrs Br.	1.43

Lincoln County

36	C. B. Yount	R#3, Vale	Indian Creek	0.89

McDowell County

638	E. B. Wright	R#3, Marion	Cox Cr.& Armstrong Cr.	0.61
282	Y. H. Walker	R#1, Old Fort	Br. of Crooked Cr.	0.24
649	Y. H. Walker	R#1, Old Fort	Br. of Little Crooked C.	0.27
507	G. W. Burgin	R#1, Old Fort	Br.of Little Crooked C.	0.59
506	Theodore McEntire	R#1, Old Fort	Br.of Little Crooked C.	0.59
500	Homer Grindstaff	Box 62, Old Fort	Crooked Cr.	0.49
502	LeRoy McEntire	R#1, Old Fort	Crooked Cr.	0.20
504	Bill Jackson	R#1, Old Fort	Crooked Cr.	0.40
505	C. W. Davis	R#1, Old Fort	Crooked Cr.	0.20
508	C. A. Gilliam	R#1, Old Fort	Crooked Cr.	0.20
281	P. O. Thomson	R#1, Old Fort	Little Crooked Cr.	0.32
326	J. O. Noblitt	Box 17, R#1, Old Fort	Little Crooked Cr.	1.25
498	Homer Grindstaff	Box 62, Old Fort	Curtis Creek	0.49
499	Homer Grindstaff	Box 62, Old Fort	Catawba R.	0.49
452	J. B. Wells	R#1, Old Fort	Catawba R.	0.51
453	G. H. Wells	R#1, Old Fort	Catawba R.	0.51
651	J. M. Tyler	Box 82, Marion	Catawba R.	0.80
285	H. B. Gibbs	Marion	Buck Cr.	1.92
333	G. W. Little	Box 286, Marion	S. Fork Nicks Cr.	0.80
454	T. W. Anderson	R#1, Marion	Goose Creek	0.20
456	E. J. Higgins	R#1, Marion	Goose Creek	0.20
501	Howard Lawing	R#1, Marion	Br. of N.Muddy Cr.	0.24
509	T. A. Hilton	Glenwood	N. Muddy Cr.	1.24
503	C. S. Randolph	R#1, Nebo	S. Muddy Cr.	1.73
650	B. C. Williams	R#2, Marion	Cove Cr.	0.57
663	W. L. Nanney	Box 102, Marion	Cove Cr.	0.40
796	Frank Cooper	R#1, Marion, E.Side U.S. 221	Br. of N. Muddy Cr.	0.68
797	Frank Cooper	R#1, Marion, W.Side U.S. 221	Br. of N. Muddy Cr.	0.68
798	B. V. Lawing	Box 73, R#1, Marion	Br. of Second Broad R.	0.60
799	Cecil Moody	Old Fort	Br. of Mackey Cr.	0.72

Mecklenburg County

619	V. B. Brown	Box 84, Davidson	Br. of Catawba R.	0.30

		Polk County		
520	J. C. Williams	R#1, Tryon	Skyuka Creek	0.25
238	Eskdale Farms	Box 488, Tryon	Pacolet R.	2.40
449	P.H.W. Jackson	R#4, Rutherfordton	Green R.	0.68
730	John C. Jackson	R#1, Campobello,S.C.	Br. of Blick Cr.	0.21
835	Emerson D. Folk	R#1, Troy	Mill Cr.	1.05
		Rutherford County		
538	Dyson Ledbetter	R#3, Box 244, Rutherfordton	Cove & Cedar Crs.	0.45
166	Gilmer Edwards	R#2, Union Mill	Br. of Catheys Cr.	1.25
487	G. G. Shuford	R#1, Ellenboro	Flint Br.	0.44
497	K. W. Price	Alexander Sub-Station, Forest City	Wilson Cr.	1.24
496	K. W. Price	Alexander Sub-Station, Forest City	Br. of Floyds	1.24
495	K. W. Price	Alexander Sub-Station, Forest City	Mill Cr.	1.74
97	B. H. Summer	Box 667, Spindale	Broad R.	1.98
792	Ralph R. Rudde	R#2, Union Mills	Camp Cr.	0.30
802	Levi C. Thompson	Union Mills	Second Broad R.	2.12
803	Levi C. Thompson	Union Mills	Second Broad R.	2.12
804	Levi C. Thompson	Union Mills	Second Broad R.	2.12
		Union County		
623	Kermit Braswell	R#2, Waxhaw	Cane Cr.	0.36

Records of wells used to supply water to industries - The bulletins indicated below, published by the North Carolina Department of Conservation and Development and prepared cooperatively by the Geological Survey, U. S. Department of the Interior, contain information regarding wells, in the Broad and Catawba River Basins, used for the purpose of supplying water to industries:

"Bulletin No. 63, Geology and Ground Water in the Charlotte Area, North Carolina, 1952".
"Bulletin No. 68, Geology and Ground Water in the Statesville Area, North Carolina, 1954".

Alexander County

Schneider Mills, Taylorsville

Date completed	1947
Topographic location	Draw
Depth of well (ft.)	210
Diameter (in.)	8
Depth of casing (ft.)	32
Water-bearing material	Mica schist
Water level (ft.)	75
Yield (g.p.m.)	80

Alexander Ice & Coal Co., 1 mile east of Taylorsville

Date completed	1949
Topographic location	Hill
Depth of well (ft.)	710
Diameter (in.)	6
Depth of casing (ft.)	45
Water bearing material	Mica schist
Water level (ft.)	60
Yield (g.p.m.)	15

Liledown Mill, 3 miles SW of Taylorsville

	Well 1	Well 2
Date completed	1940	1940
Topographic location	Slope	Hill
Depth of well (ft.)	205	215
Diameter (in.)	6	6
Depth of casing (ft.)	39	76
Water bearing material	Mica schist	Mica schist
Water level (ft.)	38	- -
Yield (g.p.m.)	5	5
Pumping level (ft.)	- -	120

Brookwood Fabrics, 3 miles SW of Taylorsville

Date completed	1946		
Topographic location	Hill		
Depth of well (ft.)	458	Water level (ft.)	40
Diameter (in.)	6	Yield (g.p.m.)	9
Depth of casing (ft.)	53	Pumping level (ft.)	145
Water bearing material	Mica schist		

Worth Spinning Company, 2 miles NW of Stony Point

Topographic location	Slope
Depth of well (ft.)	300
Diameter (in.)	8
Water bearing material	Mica schist
Water level (ft.)	50
Yield (g.p.m.)	50
Pumping level (ft.)	150

Catawba County

Hickory Spinners, 8 miles N of Conover

Date completed	1949
Topography	Slope
Depth of well (ft.)	415
Diameter (in.)	6
Depth of casing (ft.)	50
Water bearing material	Granite gneiss
Water level (ft.)	42
Yield (g.p.m.)	36
Pumping level (ft.)	50

W. J. Boettcher and Co., 3 miles NW of Hickory

Date completed	1947
Topography	Slope
Depth of well (ft.)	128
Diameter (in.)	6
Depth of casing (ft.)	35
Water-bearing material	Granite gneiss
Water level (ft.)	35
Yield (g.p.m.)	65
Pumping level (ft.)	120

Ellis Hosiery Co., 2 miles NW of Hickory

Topography	Valley
Depth of well (ft.)	343
Diameter (in.)	6
Depth of casing (ft.)	41
Water-bearing material	Granite gneiss
Water level (ft.)	10
Yield (g.p.m.)	55
Pumping level (ft.)	140

Hickory Steam Laundry, 1 mile NE of Hickory

Source	Well 1	Well 2
Date completed	1947	- -
Topography	Flat	Flat
Depth of well (ft.)	400	330
Diameter (in.)	6	6
Depth of casing (ft.)	- -	71
Water-bearing material	Granite gneiss	Granite gneiss
Water level (ft.)	94	74
Yield (g.p.m.)	60	70
Pumping level (ft.)	150	125

Hollar Construction Co., 1 mile NE of Hickory

Date completed	1946
Topography	Flat
Depth of well (ft.)	150
Diameter (in.)	6
Depth of casing (ft.)	97
Water-bearing material	Granite gneiss
Water level (ft.)	30
Yield (g.p.m.)	20
Pumping level (ft.)	80

C. G. Fox Lumber Co. and Plant, 3 miles E of Hickory

Source	Well 1	Well 2
Date completed	- -	1939
Topography	Slope	Flat
Depth of well (ft.)	338	275
Diameter (in.)	8	6
Depth of casing (ft.)	50	78
Water-bearing material	Granite gneiss	Granite gneiss
Water level (ft.)	120	30
Yield (g.p.m.)	50	45
Pumping level (ft.)	120	115

Ivey Weavers, Inc., 2 miles W of Hickory

Date completed	1941
Topography	- -
Depth of well (ft.)	298
Diameter (in.)	6
Depth of casing (ft.)	120
Water-bearing material	Granite gneiss
Water-level (ft.)	15
Yield (g.p.m.)	30
Pumping level (ft.)	20

Hickory Spinning Co., 2 miles W of Hickory

Date completed	1942
Topography	Flat
Depth of well (ft.)	402
Diameter (in.)	8
Depth of casing (ft.)	92
Water-bearing material	Granite gneiss
Yield (g.p.m.)	75
Pumping level (ft.)	- -

Hickory Well Supply Co., 2 miles SW of Hickory

Source	Well 1	Well 2
Topography	Hill	Hill
Depth of well (ft.)	57	90
Diameter (in.)	6	6
Depth of casing (ft.)	37	65
Water-bearing material	Granite gneiss	Granite gneiss
Yield (g.p.m.)	5	55
Pumping level (ft.)	15	85
Water level (ft.)	30	30

Hickory Packing Co., 3 miles E of Hickory

Source	Well 1	Well 2
Topography	Hill	Hill
Depth of well (ft.)	401	489
Diameter (in.)	6	- -
Depth of casing (ft.)	54	8
Water-bearing material	Granite gneiss	Granite gneiss
Yield (g.p.m.)	45	180
Pumping level (ft.)	130	150
Water level (ft.)	56	80
Date completed	1937	1947

Marlow Hosiery Mill, 2 miles SW of Hickory

Date completed	1943
Topography	Flat
Depth of well (ft.)	284
Diameter (in.)	6
Depth of casing (ft.)	70
Water-bearing material	Granite gneiss
Water level (ft.)	50
Yield (g.p.m.)	15
Pumping level (ft.)	70

Herman Sipe Co., 1 mile NW of Conover

Source	Well 1	Well 2
Topography	Hill	Slope
Depth of well (ft.)	416	165
Diameter (in.)	6	6
Water-bearing material	Hornblende gneiss	Hornblende gneiss
Yield (g.p.m.)	16	11
Temperature	- -	62° F.

Southern Glove Mfg. Co., 2 miles S of Conover

Date completed	1950
Topography	Flat
Depth of well (ft.)	70
Diameter (in.)	6
Depth of casing (ft.)	43
Water-bearing material	Hornblende gneiss
Water level (ft.)	30
Yield (g.p.m.)	30
Pumping level (ft.)	55

Clyde Fabrics, Inc. 1 mile NE of Newton

Date completed	1950
Topography	Flat
Depth of well (ft.)	70
Diameter (in.)	6
Depth of casing (ft.)	43
Water-bearing material	Hornblende gneiss
Water level (ft.)	30
Yield (g.p.m.)	30
Pumping level (ft.)	55

Balls Creek Broom Co., 2 miles NE of Newton

Source	Well 1	Well 2
Date completed	- -	1947
Topography	- -	Flat
Depth of well (ft.)	118	401
Diameter (in.)	6	8
Depth of casing (ft.)	97	117
Water-bearing material	Hornblende gneiss	Hornblende gneiss
Yield (g.p.m.)	- -	20

Carolina Glove Co., 7 miles SE of Newton

Date completed	1946
Topography	Hill
Depth of well (ft.)	224
Diameter (in.)	6
Depth of casing (ft.)	62
Water-bearing material	Mica schist
Water level (ft.)	32
Yield (g.p.m.)	2
Pumping level (ft.)	135

Carolina Mills, 1 mile N of Maiden

Date completed	1947
Depth of well (ft.)	333
Diameter (in.)	6
Depth of casing (ft.)	124
Water-bearing material	Hornblende gneiss
Water level (ft.)	54
Yield (g.p.m.)	9
Pumping level (ft.)	82

J & J Spinning Co., 1 mile E of Maiden

Source	Well 1	Well 4	Well 5
Date completed	1944	1948	1948
Topography	Flat	Slope	Slope
Depth of well (ft.)	102	156	215
Diameter (in.)	6	- -	6
Depth of casing (ft.)	54	73	53
Water-bearing material	Mica-schist	Mica schist	Mica schist
Water level (ft.)	- -	20	28
Yield (g.p.m.)	50	12	15
Pumping level (ft.)	- -	100	115

J & J Spinning Co., 1 mile SE of Maiden

Source	Well 1	Well 3
Date completed	1946	1947
Topography	Slope	Slope
Depth of well (ft.)	285	200
Diameter (in.)	6	6
Depth of casing (ft.)	28	49
Water-bearing material	Mica schist	Mica schist
Water level (ft.)	22	20
Yield (g.p.m.)	7	10
Pumping level (ft.)	150	100

Cleveland County

Double Shoals Mill Co., 2½ miles S of Lawndale

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth of well (ft.)	42	190	200
Diameter (in.)	6	6	6
Yield (g.p.m.)	3-4	10	12
Total hardness	- -	- -	45
Water-bearing material	Schist	- -	- -
Topography	Slope	Valley	Draw

Lawndale Cotton Mill, 2½ miles S of Lawndale

Type of well	Drilled
Depth of well (ft.)	150
Diameter (in.)	6
Yield (g.p.m.)	60
Topography	Valley

Ora Mill Co., 2½ miles W of Shelby

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth of well (ft.)	180	150	150
Diameter (in.)	6	6	6
Yield (g.p.m.)	20	30	50
Total hardness	30	15	35
Water-bearing material	Schist & gneiss	Schist & gneiss	Schist & gneiss
Topography	Slope	Draw	Draw

Dover Mill Co., 1 3/4 miles W of Shelby

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth of well (ft.)	165	165	165
Diameter (in.)	6	6	6
Yield (g.p.m.)	40	20	50
Total hardness	65	45	- -
Water-bearing material	Schist & gneiss	Schist & gneiss	Schist & gneiss
Topography	Valley	Valley	Valley

Carnation Co., 1 mile NW of Shelby

Type of well	Drilled
Depth of well (ft.)	200
Diameter (in.)	6
Yield (g.p.m.)	30
Total hardness	40
Water-bearing material	Schist & gneiss
Topography	Slope

Belmont Mills, Shelby

Type of well	Drilled		
Depth of well (ft.)	200-300		
Diameter (in.)	6	Total hardness	15
Yield (g.p.m.)	5	Topography	Flat

Shelby Cotton Mill, Shelby

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth of well (ft.)	100	1213	288
Diameter (in.)	6	8	5 5/8
Yield (g.p.m.)	2	10	10
Topography	Slope	- -	- -
Remarks	- -	not used	- -

Lily Mills Co., Shelby

Source	Well 1	Well 2
Type of well (ft.)	Drilled	Drilled
Depth of well (ft.)	186	104
Depth of casing (ft.)	- -	48
Diameter of well (in.)	5 5/8	5 5/8
Water level (ft.)	5.25	+0.5
Yield (g.p.m.)	5	20
Topography	Slope	Draw
Total hardness	- -	40
Remarks	Not in use, Nov. 1946	Flows 3-4 g.p.m.

Esther Mills Corps., Shelby

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth of well (ft.)	262	150
Depth of casing (ft.)	35	40
Diameter (in.)	5 5/8	5 5/8
Yield (g.p.m.)	50	15
Topography	Slope	Slope
Remarks	Not used - pumps muddy water	

Kings Mountain Manufacturing Co., Kings Mountain

Type of well	Dug
Depth of well (ft.)	60
Diameter of well (in.)	120
Water level (ft.)	32
Yield (g.p.m.)	60
Water-bearing material	Schist
Topography	Slope
Remarks	Well formerly shaft for tin mine

Park Yarn Mills, Inc., 1½ miles SW of Kings Mountain

Type of well	Dug
Depth of well (ft.)	78
Depth of casing (ft.)	23
Diameter (in.)	4
Yield (g.p.m.)	19
Water-bearing material	Schist
Topography	Draw

Neisler Mills, Inc., Margrace Plant, 1½ miles SW of Kings Mountain

Source	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Well 7
Type of well	Drilled	Drilled	Drilled	Drilled	Drilled	Drilled	Drilled
Depth of well (ft.)	430	262	90	182	147	750	175
Depth of casing (ft.)	- -	50	90	120	32	- -	- -
Diameter (in.)	8	8	7	6	8	8	6
Yield (g.p.m.)	25-30	15	80	35	55	60	10-12
Water-bearing Material	Schist	- -	- -	Schist	- -	Schist	Schist
Topography	Hill	Hill	Draw	Flat	Draw	Draw	Flat

Minette Mills, Inc., Grover

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth of well (ft.)	100	84	48
Depth of casing (ft.)	- -	72	36
Diameter (in.)	4	8	8
Yield (g.p.m.)	7	40	50
Total hardness	30	- -	- -
Topography	Hill	Draw	Draw

Runyans Gin Co., Earl

Type of well	Drilled
Depth of well (ft.)	98
Diameter (in.)	6
Yield (g.p.m.)	15
Topography	Slope

Gaston County

Lola Mills, Inc., Stanley

Source	Well 1	Well 2
Depth of well (ft.)	70	85
Type of well	Drilled	Drilled
Diameter (in.)	6	6
Depth of casing (ft.)	25	- -
Water level (ft.)	25	- -
Yield (g.p.m.)	8-9	9
Total hardness	50	- -
Water-bearing material	Granite	- -
Topography	Hill	Hill

Hardin Mfg. Co., 2 miles SE of High Shoals

Type of well	Drilled
Depth of well (ft.)	226
Diameter (in.)	8
Water level (ft.)	26
Yield (g.p.m.)	25
Total hardness	110
Water-bearing material	Granite
Topography	Valley

Carolinian Mill, High Shoals

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	- -
Depth of well (ft.)	319	351	100
Diameter (in.)	8 & 6	8	4
Water level (ft.)	- -	20	- -
Yield (g.p.m.)	30	45	20-45
Total hardness	75	45	- -
Water-bearing material	Granite	Schist	Granite
Topography	Draw	Slope	Valley

Carlton Mills, Cherryville

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth of well (ft.)	97	118
Diameter (in.)	5 5/8	5 5/8
Yield (g.p.m.)	25-30	25-30
Total hardness	- -	55
Topography	Draw	Draw

Carolina Freight Carriers, Cherryville

Type of well	Drilled
Depth of well (ft.)	300
Diameter (in.)	6
Yield (g.p.m.)	15
Total hardness	35
Topography	Draw

Rhyne-Hauser Co., Cherryville (plant 1)

Source	Well 4	Well 5
Type of well	Drilled	Drilled
Depth of well (ft.)	1965	145
Diameter (in.)	5 5/8	5 5/8
Depth of casing (ft.)	80	118
Water level (ft.)	8	- -
Yield (g.p.m.)	80	10
Total hardness	35	- -
Topography	Draw	Hill
Remarks		Not used, insufficient water

Howell Mfg. Co., Cherryville

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth of well (ft.)	139	90	90
Diameter (in.)	5 5/8	5 5/8	5 5/8
Yield (g.p.m.)	26	18	5
Total hardness	30	- -	- -
Topography	Hill	Hill	Hill

Moroweb Cotton Mills Co., Dallas

Type of well	Drilled	Yield (g.p.m.)	7
Depth (ft.)	65	Total hardness	50
Diameter (in.)	6	Topography	Draw

Spencer Mountain Mill, Spencer Mountain

Type of well	Drilled
Depth of well (ft.)	82
Diameter (in.)	6
Depth of casing (ft.)	14
Water level (ft.)	18
Yield (g.p.m.)	6
Total hardness	25
Water-bearing material	Quartzite
Topography	Draw

Globe Mills, Inc., 1 ¼ miles NW of Mount Holly

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth (ft.)	65	143
Diameter (in.)	3	8
Yield (g.p.m.)	18	15
Total hardness	55	40

Kendrick Brick & Tile Co., 1 mile NW of Mount Holly

Source	Well 1	Well 2
Type of well	Drilled	Core drilled
Depth (ft.)	60	185
Diameter (in.)	6	2
Yield (g.p.m.)	- -	10
Total hardness	45	45
Water-bearing material	Diorite	Diorite
Topography	Hill	Slope

American Yarn, Inc. Nims Plant, 1 mile N of Mt. Holly

Type of well	Drilled
Depth (ft.)	208
Diameter (in.)	8
Yield (g.p.m.)	0 well not used; no water obtained
Topography	Valley
Water-bearing material	Diorite

Superior Yarn Mills, 2 miles S of Mount Holly

Source	Well 1	Well 2
Type of well	Drilled	Core drilled
Depth (ft.)	223	37
Diameter (in.)	8	3
Yield (g.p.m.)	46	10
Total hardness	85	145
Water-bearing material	Schist?	Schist
Topography	Slope	Valley

Acme Spinning Co., North Belmont

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth (ft.)	193	390	527
Diameter (in.)	6	8	8
Yield (g.p.m.)	10	30	45
Total hardness	60	60	60
Water-bearing material	Schist	Schist	Schist
Topography	Hill	Draw	Hill

Linford Mills, Inc., North Belmont

Type of well	Drilled
Depth (ft.)	300
Diameter (in.)	8
Yield (g.p.m.)	35
Total hardness	85
Water-bearing material	Schist
Topography	Slope

Perfection Spinning Co., North Belmont

Type of well	Drilled
Depth (ft.)	284
Diameter (in.)	8
Yield (g.p.m.)	60
Total hardness	40
Water-bearing material	Schist
Topography	Slope

Stowe Spinning Co., North Belmont

Source	Well 1	Well 2	Well 3	Well 4
Type of well	Drilled	Drilled	Drilled	Drilled
Depth (ft.)	1,053	85	300	225
Diameter (in.)	10-8-6	6	10	8
Yield (g.p.m.)	85	5	12-15	14
Total hardness	80	- -	50	60
Water-bearing material	Schist	Schist	Schist	Schist
Topography	Slope	Hill	Draw	Slope

Climax Spinning Co., Belmont

Type of well	Core drilled
Depth (ft.)	170
Diameter (in.)	3
Yield (g.p.m.)	1.5
Total hardness	45
Water-bearing material	Schist
Topography	Ridge

Sterling Spinning Co., Belmont

Type of well	Drilled
Depth (ft.)	375
Diameter (in.)	
Water-level (ft.)	40
Yield (g.p.m.)	4
Total hardness	60
Water-bearing material	Schist
Topography	Draw

South Fork Mfg. Co., 1 mile NW of Belmont

Type of well	Drilled
Depth (ft.)	325
Diameter (in.)	8
Yield (g.p.m.)	60
Total hardness	50
Water-bearing material	Schist
Topography	Draw

Crescent Spinning Co., Belmont

Source	Well 1	Well 2
Type of well	Core drilled	Drilled
Depth of well (ft.)	100	132
Diameter (in.)	3	10
Depth of casing (ft.)	--	85
Yield (g.p.m.)	12	5
Total hardness	30	--
Water-bearing material	Schist	Schist
Topography	Hill	Hill
Remarks	--	Well abandoned; not enough water

National Yarn Mills, Belmont

Source	Well 1	Well 2	Well 3
Type of well	Core drilled	Core drilled	Core drilled
Depth of well (ft.)	128	118	132
Diameter (in.)	3	3	3
Depth of casing (ft.)	90	80	80
Yield (g.p.m.)	7	3.5	3.5
Total hardness	40	--	--
Water-bearing material	Schist	--	Schist
Topography	Slope	Slope	Slope

Imperial Yarn Mills, Inc., Belmont

Source	Well 1	Well 2	Well 3	Well 4
Type of well	Core drilled	Core drilled	Drilled	Core drilled
Depth (ft.)	148	160	103	65
Diameter (in.)	3	3	6	3
Water level (ft.)	35-40	35	--	10
Yield (g.p.m.)	6	5	8	11
Total hardness	--	--	75	90
Water-bearing material	Schist	Schist	Schist	Schist
Topography	Hill	Slope	Slope	Draw

Montebell Ice & Fuel Co., Belmont

Source	Well 1	Well 2
Type of well	Drilled	Core drilled
Depth (ft.)	80	100
Diameter (in.)	6	3
Yield (g.p.m.)	30	15
Total hardness	65	--
Water-bearing material	Schist	Schist
Topography	Draw	Draw

Eagle Yarn Mills, 1¼ miles SW of Belmont

Type of well	Drilled
Depth (ft.)	365
Diameter (in.)	8
Yield (g.p.m.)	27
Total hardness	125
Water-bearing material	Schist
Topography	Draw

National Weaving Co., Lowell

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth (ft.)	100	100	180
Diameter (in.)	6	6	6
Yield (g.p.m.)	22	14	60
Water-bearing material	- -	- -	Schist
Topography	Draw	Slope	Slope
Remarks	- -	Not in use	Not in use

Akers Motor Lines Co., 2 miles E of Gastonia

Type of well	Drilled
Depth of well (ft.)	105.5
Diameter (in.)	5 5/8
Depth of casing (ft.)	76
Water level (ft.)	26
Yield (g.p.m.)	18
Total hardness	35
Water-bearing material	Schist
Topography	Slope

A. M. Smyre Mfg., 3¼ miles NE of Gastonia

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth of well (ft.)	140	251
Diameter (in.)	5 5/8	6
Depth of casing (ft.)	- -	42
Water level (ft.)	- -	42
Yield (g.p.m.)	14	12
Total hardness	- -	30
Topography	Flat	Hill

Ranlo Mfg. Co., 4 miles NE of Gastonia

Type of well	Drilled
Depth of well(ft.)	130
Water level (ft.)	19.1
Yield (g.p.m.)	20
Total hardness	35
Topography	Draw

Textiles Inc., Priscilla Plant, 4 miles NE of Gastonia

Source	Well 1	Well 2	Well 3	Well 4	Well 5
Type of well	Drilled	Drilled	Drilled	Drilled	Drilled
Depth of well (ft.)	585	79	500	178	200
Diameter (in.)	6	5 5/8	8	5 5/8	5 5/8
Depth of casing (ft.)	- -	48	85	60	- -
Water level (ft.)	- -	38	42	18	- -
Yield (g.p.m.)	20	8	102	10	10
Total hardness	- -	- -	80	- -	- -
Water-bearing Material	- -	Schist	Shist & quartzite	Schist	Schist
Topography	Hill	Hill	Draw	Draw	Draw
Remarks	Not used	Not used	- -	Not used	- -

Groves Thread Co., 2½ miles NE of Gastonia

Source	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Well 7
Type of well	Drilled	Drilled	Drilled	Drilled	Drilled	Drilled	Drilled
Depth of well (ft.)	165	145	85	90	85	132	60
Diameter (in.)	6	5 5/8	5 5/8	6	6	6	6
Depth of casing (ft.)	- -	- -	- -	- -	- -	- -	- -
Water level (ft.)	80	- -	- -	- -	- -	- -	- -
Yield (g.p.m.)	90	35	15	30	16	12	12
Total hardness	115	45	- -	- -	- -	- -	- -
Water-bearing material	Granite	Granite	Granite	Granite	Granite	Granite	Granite
Topography	Draw	Draw	Draw	Draw	Draw	Draw	Hill

Rex Spinning Co., 4 miles NE of Gastonia

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth (ft.)	69.5	61	167
Diameter (in.)	5 5/8	5 5/8	5 5/8
Water level (ft.)	50	- -	44
Yield (g.p.m.)	11	8	30
Total hardness	45	- -	30
Water-bearing material	Granite	Granite	Granite
Topography	Draw	Draw	Draw

Grenton Mills, Gastonia

Type of well	Drilled
Depth (ft.)	265 ?
Diameter (in.)	6
Yield (g.p.m.)	30
Water-bearing material	Schist
Topography	Draw

Sunrise Dairy, Gastonia

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth of well (ft.)	136	96
Diameter (in.)	6	6
Depth of casing (ft.)	15	43
Water level (ft.)	25	15
Yield (g.p.m.)	15	21
Water-bearing material	Schist	Granite
Topography	Slope	Draw

Ruby Cotton Mill, 1¼ miles S of Gastonia

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth (ft.)	135	185	185
Diameter (in.)	6	6	6
Water level (ft.)	30	- -	30
Yield (g.p.m.)	8	8	5
Total hardness	30	- -	- -
Water-bearing material	Granite	Granite	Granite
Topography	Draw	Draw	Hill

Textiles, Inc. Seminole Plant, 1 mile S of Gastonia

Type of well	Drilled
Depth (ft.)	120
Diameter (in.)	6
Yield (g.p.m.)	5
Water-bearing material	Granite
Topography	Slope

Textiles, Inc., Osceola Plant, 1¼ miles S of Gastonia

Type of well	Drilled
Depth (ft.)	122
Diameter (in.)	6
Water level (ft.)	- -
Yield (g.p.m.)	35
Water-bearing material	Granite
Topography	Hill

Dixon Mills, 1½ miles S of Gastonia

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth (ft.)	185	53
Diameter (in.)	5 5/8	5 5/8
Water-level (ft.)	15	10
Yield (g.p.m.)	35	16
Total hardness	- -	35
Water-bearing material	Granite	Granite
Topography	Draw	Draw

Textiles, Inc. Victory Plant, 2 miles S of Gastonia

Type of well	Drilled
Depth (ft.)	135
Diameter (in.)	6
Yield (g.p.m.)	12
Total hardness	20
Water-bearing material	Granite
Topography	Flat

Textiles, Inc., Myers Plant, 2½ miles S of Gastonia

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth (ft.)	110	103.5	120
Diameter (in.)	5 5/8	5 5/8	5 5/8
Yield (g.p.m.)	12	5	16
Total hardness	20	- -	35
Water-bearing material	Granite	Granite	Granite
Topography	Flat	Draw	Hill

Rex-Hanover Mills, Inc., (Hanover Plant), 2 3/4 miles S of Gastonia

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth of well (ft.)	180	267	140
Diameter (in.)	6	8	5 5/8
Depth of casing (ft.)	- -	112	- -
Water level (ft.)	40	- -	- -
Yield (g.p.m.)	20	30	5
Total hardness	40	- -	- -
Water-bearing material	Granite	- -	Granite
Topography	Flat	Draw	Hill

Textiles, Inc., Ridge Plant, 3½ miles S of Gastonia

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth of well (ft.)	185	120
Diameter (in.)	5 5/8	5 5/8
Depth of casing (ft.)	35	- -
Water level (ft.)	10	- -
Yield (g.p.m.)	20	5
Total hardness	35	- -
Water-bearing material	Granite	Granite
Topography	Draw	Hill

Firestone Mills, Inc., Gastonia

Source	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Well 7
Type of well	Drilled	Drilled	Drilled	Drilled	Drilled	Drilled	Drilled
Depth (ft.)	80	214	125	145	107	92	?
Diameter (in.)	6	8	6	6	6	6	6
Water level (ft.)	- -	0.13	10.2	10.6	- -	5.07	- -
Yield (g.p.m.)	44	80	20	18	33	15	12
Water-bearing Material	Granite	Granite	Granite	Granite	Granite	Granite	Granite
Topography	Draw	Draw	Draw	Draw	Draw	Draw	- -
Remarks	Water reported soft	Not in use	Not in use	- -	Not in use	- -	- -

Parkdale Mill, Inc., 1½ miles W of Gastonia

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth of well (ft.)	180	210
Diameter (in.)	5 5/8	5 5/8
Depth of casing (ft.)	100	100
Yield (g.p.m.)	10	35
Total hardness	35	- -
Water-bearing material	Granite	Granite
Topography	Draw	Slope

Bloom Mills, Inc., 1½ miles W of Gastonia

Type of well	Drilled
Depth (ft.)	98
Diameter (in.)	6
Water level (ft.)	58
Yield (g.p.m.)	8
Total hardness	35
Water-bearing material	Granite
Topography	Hill

Textiles, Inc., Arlington Plant, 1½ miles W of Gastonia

Type of well	Drilled
Depth (ft.)	160
Diameter (in.)	6
Yield (g.p.m.)	18
Total hardness	30
Water-bearing material	Granite
Topography	Hill

Threads, Inc., 2 miles W of Gastonia

Source	Well 1	Well 2	Well 3	Well 4	Well 5
Type of well	Drilled	Drilled	Drilled	Drilled	Drilled
Depth of well (ft.)	105	490	76.5	490	950 (Approx.)
Diameter (in.)	8	8	8	8	8
Depth of casing (ft.)	44	- -	- -	80	- -
Water level (ft.)	10	- -	- -	- -	- -
Yield (g.p.m.)	10	2	12	15	- -
Total hardness	- -	- -	- -	45	- -
Water-bearing material	Granite	Granite	Granite	Granite	Granite
Topography	Draw	Draw	Slope	- -	Draw
Remarks	- -	Not in use	Abandoned	Not in use	

Textiles, Inc., Myrtle Plant, 2¼ miles W of Gastonia

Type of well	Drilled
Depth (ft.)	160
Diameter (in.)	6
Yield (g.p.m.)	10
Total hardness	30
Water-bearing material	Granite
Topography	Slope

Ragan Spinning Co., 2 miles E of Bessemer City

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth of well (ft.)	271.5	168	238.5
Diameter (in.)	6	6	6
Depth of casing (ft.)	- -	106	77
Water level (ft.)	- -	50	32.5
Yield (g.p.m.)	6	50	12
Total hardness	- -	45	- -
Water-bearing material	Schist	Schist	- -
Topography	Slope	Draw	Hill
Remarks	Not used	- -	- -

Ideal Machine Shop, 1 3/4 miles E of Bessemer City

Type of well	Drilled
Depth of well (ft.)	130
Diameter (in.)	5 5/8
Depth of casing (ft.)	110
Water level (ft.)	27
Yield (g.p.m.)	12
Total hardness	50
Water-bearing material	Schist
Topography	Draw

Osage Mfg. Co., Bessemer City

Type of well	Drilled
Depth of well (ft.)	150
Diameter (in.)	6
Depth of casing (ft.)	50
Yield (g.p.m.)	15
Topography	Flat

Frieda Mfg. Co., Mountain View

Source	Well 1	Well 2
Type of well	Dug	Dug
Depth of well (ft.)	41	17
Diameter (in.)	24	24
Depth of casing (ft.)	41	15
Water level (ft.)	37.7	6.5
Yield (g.p.m.)	- -	15
Water-bearing material	Schist	Gravel (?)
Topography	Hill	Valley

Lincoln County

Rudisill Spinning Co., 2 miles SW of Lincolnton

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Core drilled	Drilled
Depth (ft.)	100	90	200
Diameter (in.)	6	3	8
Water level (ft.)	- -	34.3	39
Yield (g.p.m.)	10	4.5	100
Water-bearing material	Granite	Granite	Granite
Topography	Hill	Hill	Hill

Rhodes-Rhyne Mfg. Co., 2 miles SW of Lincolnton

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth (ft.)	250	160
Diameter (in.)	6	6
Yield (g.p.m.)	20-25	20-25
Total hardness	20	- -
Water-bearing material	Granite	Granite
Topography	Slope	Draw

Glenn Mfg. Co., 1 mile SW of Lincolnton

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth (ft.)	160	150	150
Diameter (in.)	6	4	4
Yield (g.p.m.)	15	10	5
Total hardness	- -	- -	30
Water-bearing material	- -	- -	- -
Topography	Draw	Draw	Slope

Crown Converting Co., ½ mile NW of Lincolnton

Type of well	Drilled
Depth (ft.)	131
Diameter (in.)	6
Yield (g.p.m.)	10-15
Total hardness	90
Water-bearing material	Schist
Topography	Hill

Coble Dairy Products, Inc., Lincolnton

Type of well	Drilled
Depth (ft.)	90
Diameter (in.)	8
Yield (g.p.m.)	30
Total hardness	90
Water-bearing material	Granite
Topography	Draw

Ideal Chair Co., Lincolnton

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth (ft.)	200	700
Diameter (in.)	4	6
Yield (g.p.m.)	6	4
Total hardness	85	- -
Water-bearing material	- -	Granite
Topography	Hill	Hill
Remarks	- -	Not used

Cochrane Furniture Co., 3/4 mile E of Lincolnton

Type of well	Drilled
Depth of well (ft.)	302
Diameter (in.)	6
Depth of casing (ft.)	80
Water level (ft.)	22
Yield (g.p.m.)	100
Total hardness	45
Water-bearing material	- -
Topography	Draw

Lineberger Ice & Fuel Co., 1¼ miles E of Lincolnton

Type of well	Drilled
Depth (ft.)	140
Diameter (in.)	6
Yield (g.p.m.)	35
Total hardness	50
Topography	Draw

Boger & Crawford Spinning Co., 2 miles E of Lincolnton

Source	Well 1	Well 2	Well 3	Well 4
Type of well	Drilled	Core drilled	Drilled	Drilled
Depth (ft.)	140	400	166	175
Diameter (in.)	8	6	6	8
Depth of casing (ft.)	118	100	- -	90
Water level (ft.)	53	40	40	42
Yield (g.p.m.)	32	30	16	10
Total hardness	40	25	35	25
Water-bearing material	- -	- -	- -	- -
Topography	Draw	Flat	Draw	Flat

D. E. Rhyne Mills Laboratory Plant, 2½ miles SE of Lincolnton

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth of well	300	180
Diameter (in.)	6	6
Depth of casing (ft.)	- -	- -
Water level (ft.)	- -	- -
Yield (g.p.m.)	20	10
Total hardness	45	40
Water-bearing material	Schist	Schist
Topography	Valley	Slope

Long Shoals Cotton Mills, Inc., Long Shoals

Source	Well 1	Well 2	Well 3
Type of well	Core drilled	Drilled	Drilled
Depth of well (ft.)	50	710	129.5
Diameter (in.)	3	8-6	5 5/8
Depth of casing (ft.)	- -	50	73
Water level (ft.)	- -	- -	- -
Yield (g.p.m.)	10	17	40
Total hardness	- -	50	- -
Water-bearing material	- -	Schist	Schist
Topography	Valley	Hill	Draw

Cherryville Spinning Co., Mariposa

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth (ft.)	100	100
Diameter (in.)	3	3
Yield	Adequate supply	Adequate supply
Total hardness	45	- -
Topography	Hill	Slope

Mecklenburg County

Davidson Cotton Mills, Inc., Davidson

Source	Well 1	Well 2
Type of well	Core drilled	Core drilled
Depth (ft.)	80	60-80
Diameter (in.)	2	- -
Water level (ft.)	22	- -
Yield (g.p.m.)	4	14
Total hardness	65	- -
Topography	Draw	Draw

Davidson Ice & Fuel Co., Davidson

Type of well	Core drilled
Depth of well (ft.)	100
Diameter (in.)	4
Depth of casing (ft.)	35
Yield (g.p.m.)	11
Total hardness	80
Topography	Slope

Cornelius Mills, Inc., Cornelius

Source	Well 1	Well 2	Well 3	Well 4
Type of well	Core drilled	Core drilled	Core drilled	Core drilled
Depth of well (ft.)	115	127	106	55
Diameter (in.)	3	2	4	4
Depth of casing (ft.)	90	- -	- -	- -
Yield (g.p.m.)	15	8	70	50
Total hardness	60	- -	- -	- -
Water-bearing material	Schist	Schist	Schist	Schist
Topography	Flat	Flat	Flat	Flat

Gem Yarn Mills, Cornelius

Source	Well 1	Well 2
Type of well	Core drilled	Core drilled
Depth (ft.)	90	160
Diameter (in.)	2	2
Yield (g.p.m.)	5	3 3/4
Water-bearing material	Schist	Schist
Topography	Draw	Hill

Anchor Mills Co., Huntersville

Source	10 wells	Well 11	Well 12
Type of well	Core drilled	Drilled	Core drilled
Depth of well (ft.)	35-81	185	350
Diameter (in.)	2	5	3
Depth of casing (ft.)	38-81	- -	- -
Water level (ft.)	5-30	- -	- -
Yield (g.p.m.)	27.5	10-12	12
Total hardness	105	- -	70
Topography	Draw	Draw	Hill

Plantation Pipeline Co., 3 miles SE of Huntersville

Type of well	Drilled
Depth (ft.)	260
Diameter (in.)	8
Total hardness	15
Water-bearing material	Granite
Topography	Draw

Mecklenburg Furniture Shop, 4 3/4 miles NE of Charlotte

Type of well	Core drilled
Depth of well (ft.)	134
Diameter (in.)	3
Depth of casing (ft.)	94
Yield (g.p.m.)	9
Total hardness	60
Topography	Flat

Louis G. Ratcliffe, Inc., (Greenhouses), Derita

Source	4 wells	Depth of casing (ft.)	92-135
Type of wells	Core drilled	Yield (g.p.m.)	11-35 each
Depth of wells (ft.)	92-135	Total hardness	55
Diameter (in.)	2	Topography	Draw

Interstate Granite Corporation, 2½ miles NE of Charlotte

Source	Well 1	Well 2
Type of well	Core drilled	Core drilled
Depth (ft.)	165	200
Diameter (in.)	4	4
Yield (g.p.m.)	35	35
Water-bearing material	Granite	Granite
Topography	Slope	Draw

Planters Fertilizers & Phosph. Co., 2¼ miles NW of Charlotte

Type of well	Dug
Depth (ft.)	31
Diameter (in.)	30
Water level (ft.)	25
Yield (g.p.m.)	5

Chadwick-Hoskins Co., 3½ miles NW of Charlotte

Type of well	Drilled
Depth (ft.)	549
Diameter (in.)	10
Yield (g.p.m.)	100
Total hardness	80
Topography	Draw

Mecklenburg Nurseries, 4 miles NW of Charlotte

Type of well	Core drilled
Depth of well (ft.)	135
Diameter (in.)	2
Depth of casing (ft.)	90
Yield (g.p.m.)	4-5
Total hardness	60
Topography	Hill

National Carbon Co., 4½ miles NW of Charlotte

Source	Well 1	Well 2	Well 3
Type of well	Core drilled	Core drilled	Core drilled
Depth of well (ft.)	150	135	108
Diameter (in.)	4	4	4
Depth of casing (ft.)	100	102	84
Yield (g.p.m.)	18	8	7
Total hardness	35	- -	- -
Topography	Hill	Draw	Draw

Leaksville Woolen Mills Co., 1¼ miles NE of Paw Creek

Source	Well 4	Well 5	Well 6	Well 7
Type of well	Drilled	Drilled	Drilled	Drilled
Depth (ft.)	350	300	116.5	1074
Diameter (in.)	10	10	10	10
Yield (g.p.m.)	36	60	68	67.5
Total hardness	55	75	170	72
Topography	Draw	Draw	Draw	Draw
Remarks	Well 1 and 3 not in use; well 2 never used - water too hard.			

Standard Oil Plant, Paw Creek

Type of well	Drilled
Depth (ft.)	306
Diameter (in.)	6
Yield (g.p.m.)	55
Total hardness	40
Topography	Draw

Shell Oil Plant, Paw Creek

Type of well	Drilled
Depth of well (ft.)	148
Diameter (in.)	6
Depth of casing (ft.)	80.5
Water level (ft.)	21
Yield (g.p.m.)	36
Total hardness	40
Topography	Draw

American Oil Co., Plant, Paw Creek

Type of well	Core drilled
Depth (ft.)	85
Diameter (in.)	3
Yield (g.p.m.)	- -
Total hardness	80
Topography	Draw

Kendall Mills Thrift Plant, Paw Creek

Source	Well	Group of 6 wells
Type of well	Drilled	Core drilled
Depth of well (ft.)	600	33-65
Diameter (in.)	10-8	2.5
Depth of casing (ft.)	60	33-65
Water level (ft.)	32	0.5-2
Yield (g.p.m.)	5	14
Total hardness	150	60
Topography	Slope	Valley

McClure Lumber Co., 2 miles N of Paw Creek

Type of well	Core drilled
Depth of well (ft.)	115
Diameter (in.)	3
Depth of casing (ft.)	76
Yield (g.p.m.)	4
Water-bearing material	Granite
Topography	Hill

Southern Dyestuff Corp., 4 miles NW of Paw Creek

Type of well	Drilled
Depth of well (ft.)	221
Diameter (in.)	6
Depth of casing (ft.)	60
Yield (g.p.m.)	38
Total hardness	450

American Cyanimide Co., 2 3/4 miles W of Charlotte

Type of well	Drilled
Depth (ft.)	149
Diameter (in.)	6
Yield (g.p.m.)	28
Total hardness	42
Water-bearing material	Diorite

Southern Engineering Co., 2½ miles W of Charlotte

Type of well	Drilled
Depth of well (ft.)	42.5
Diameter (in.)	5 5/8
Depth of casing (ft.)	40
Water level (ft.)	4
Yield (g.p.m.)	25
Total hardness	55
Topography	Draw

Scholtz Greenhouses, Charlotte

Type of well	Core drilled
Depth of well (ft.)	225
Diameter (in.)	4
Depth of casing (ft.)	60
Water level (ft.)	20
Yield (g.p.m.)	22
Total hardness	60
Topography	Slope

Shoenith Candy Co., Charlotte

Type of well	Dug
Depth (ft.)	110
Diameter (in.)	72
Yield (g.p.m.)	10
Total hardness	40
Topography	Slope

Charlotte Pipe & Foundry Co., Charlotte

Type of well	Drilled
Depth (ft.)	196
Diameter (in.)	6
Water level (ft.)	20
Yield (g.p.m.)	10-15
Total hardness	105
Topography	Slope

Air Reduction Sales Co., Charlotte

Type of well	Drilled
Depth of well (ft.)	200
Diameter (in.)	6
Depth of casing (ft.)	85
Yield (g.p.m.)	50
Total hardness	113
Topography	Draw

National Welding Supply Co., Charlotte

Type of well	Core drilled
Depth of well (ft.)	150
Diameter (in.)	3
Yield (g.p.m.)	18
Total hardness	55
Water-bearing material	Granite
Topography	Draw

Highland Park Mfg. Co., Charlotte

Source	Group of 13 wells	Well	Well	3 groups of 6 wells each
Type of wells	Core drilled	Drilled	Drilled	Core drilled
Depth (ft.)	30 to 80	75	87	30 to 60
Diameter (in.)	2	6	6	2
Yield (g.p.m.)	15	14	9	40
Topography	Slope	Slope	Draw	Slope

Pure Oil Co., 4 3/4 miles SE of Charlotte

Type of well	Drilled
Depth (ft.)	62
Diameter (in.)	6
Yield (g.p.m.)	30
Total hardness	35
Topography	Draw

Hudson Hosiery Co., 4½ miles SE of Charlotte

Type of well	Core drilled
Depth of well (ft.)	95
Diameter (in.)	4
Depth of casing (ft.)	85
Water level (ft.)	18
Yield (g.p.m.)	15
Total hardness	30
Water-bearing material	Granite
Topography	Draw

United Arco Service, 7 miles E of Charlotte

Type of well	Core drilled
Depth (ft.)	149
Diameter (in.)	3
Water level (ft.)	18
Yield (g.p.m.)	30
Water-bearing material	Granite
Topography	Draw

Allen & Brooks Ginning Co., 3½ miles NE of Mint Hill

Source	Well 1	Well 2
Type of well	Core drilled	Core drilled
Depth (ft.)	178	134
Diameter (in.)	4	2
Yield (g.p.m.)	12	5
Total hardness	- -	50
Water-bearing material	Slate	- -
Topography	Slope	Flat
Remarks	Not in use	

Kingcraft Hosiery Mill, Mint Hill

Type of well	Core drilled
Depth (ft.)	110
Diameter (in.)	2
Yield (g.p.m.)	8

R. J. McEwen & Son, Mint Hill

Type of well	Core drilled
Depth (ft.)	80
Diameter (in.)	2
Yield (g.p.m.)	7
Total hardness	35
Topography	Draw

U. S. Rubber Co. Shell Loading Plant, 3 3/4 miles NW of Pineville

Source	Well 1	Well 2
Type of well	Core drilled	Core drilled
Depth (ft.)	196	145
Diameter (in.)	3	3
Water level (ft.)	12	12
Yield (g.p.m.)	40	30
Water-bearing material	Gabbro	Gabbro
Topography	Flat	Flat
Remarks	Not used; well capped	Not used; well capped

Polk County

Southern Mercerizing Co., 3/4 mile N of Tryon

Source	3 wells
Type of wells	Drilled
Depth (ft.)	38
Diameter (in.)	2
Yield (g.p.m.)	45
Topography	Valley

Rutherford County

Grace Cotton Mill Co., Rutherfordton

Type	Drilled
Depth (ft.)	395
Diameter (in.)	6
Yield (g.p.m.)	7½
Topography	Hill

Elmore Corporation, Spindale

Type of well	Drilled
Depth (ft.)	650
Diameter (in.)	8-6
Yield (g.p.m.)	250
Use (g.p.d.)	300,000
Topography	Hill

Alexander Mills, Inc., Alexander Mills

Source	South group 9 wells	East group 8 wells	Well 18
Type of wells	Driven	Driven	Drilled
Depth (ft.)	60	60	340
Diameter (in.)	2	2	8
Yield (g.p.m.)	45-50	45-50	60
Use	24 hrs. a day at 40 g.p.m.	24 hrs. a day at 40 g.p.m.	About 6 hrs. a day
Topography	Draw	Draw	Slope

Neisler Mills Corp., 1 mile NW of Ellenboro

Source	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6
Type of well	Drilled	Drilled	Drilled	Drilled	Drilled	Drilled
Depth of well (ft.)	90	59	174	45	48	77
Diameter (in.)	5 5/8	5 5/8	5 5/8	5 5/8	5 5/8	5 5/8
Depth of casing (ft.)	- -	- -	65	40	15	15
Yield (g.p.m.)	5	18	50	30	50	8
Water-bearing material	Schist	Schist	Schist	Schist	Schist	Schist
Topography	Slope	Slope	Draw	Draw	Draw	Draw

Caroleen Mills Co., Caroleen

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth (ft.)	250	250	250
Diameter (in.)	6	6	6
Yield (g.p.m.)	15	20	15
Topography	Slope	Draw	Slope

Cliffside Mills, Haynes Plant, Avondale

Source	Well 1	Group of 5 wells	Well 7	Well 8
Type of well	Drilled	Drilled	Drilled	Drilled
Depth (ft.)	1301	20-30	190	191
Diameter (in.)	6	2	6	6
Yield (g.p.m.)	10	- -	20	75
Topography	Draw	Draw	Slope	Hill
Remarks	Not used	- -	Abandoned	Not used

Henrietta Mill Co., Henrietta

Source	Well 1	Well 2	Well 3
Type of well	Drilled	Drilled	Drilled
Depth (ft.)	750	125	125
Diameter (in.)	8-6	5 5/8	5 5/8
Yield (g.p.m.)	25	25	25
Topography	Slope	Slope	Slope

Cliffside Mills, at and near Cliffside

Source	Well 1	Well 2	Well 3	Well 4	Well 5
Type of well	Drilled	Drilled	- -	Drilled	Drilled
Depth of well (ft.)	86	800?	- -	302	127
Diameter (in.)	6	10.6	- -	6	6
Depth of casing (ft.)	- -	- -	- -	- -	- -
Water level (ft.)	- -	- -	- -	- -	- -
Yield (g.p.m.)	10	- -	35	Small yield	20
Topography	- -	- -	Valley	Hill	Slope
Remarks	- -	- -	Not used	- -	- -

Harris Gin and Ice Co., Harris

Source	Well 1	Well 2
Type of well	Drilled	Drilled
Depth of well (ft.)	178	130
Diameter (in.)	5 5/8	5 5/8
Depth of casing (ft.)	20	20?
Water level (ft.)	- -	- -
Yield (g.p.m.)	5	20
Topography	Draw	Draw

House Document No. 96, 73rd Congress, 1st Session - This publication contains the reports of the District Engineer, Charleston District; the Division Engineer, South Atlantic Division; the Board of Engineers for Rivers and Harbors; and the Chief of Engineers, U. S. Army, on a general plan for the improvement of Santee River, North Carolina and South Carolina, for the purposes of navigation and efficient development of water power, the control of floods, and the needs of irrigation. The report of the Chief of Engineers was submitted to the Secretary of War for transmission to Congress on March 2, 1933. He indicated his opinion that no improvement of this stream for navigation; either alone or in connection with power development, flood control, or irrigation, or any combination thereof, other than as authorized by existing projects, should be undertaken by the United States at that time. The District Engineer investigated nine major projects and made computations, based upon operation with flood control and without flood control, of the electric energy generated, the cost of the developments, and the future demand for power. Only one of the three projects, the Clinchfield Project, is located in North Carolina.

Clinchfield Project - This project would be located on Broad River 0.25 mile above the crossing of the Carolina, Clinchfield and Ohio Railway, about 8 miles north of Chesnee, South Carolina, and approximately 10 miles south of Forest City, Rutherford County. The reservoir site is located wholly in Rutherford and Polk Counties. The main structure would be an earthen dam across Broad River. The spillway would be located in a natural depression on the east side, permitting the flood waters to be discharged at some distance below the toe of the main dam. The tailwater of the project would be at the elevation of maximum reservoir-level of the proposed Gaston Shoals Project below (five miles northeast of Gaffney, South Carolina). The elevation of the flow line, 820 feet, is the maximum reservoir level of the Clinchfield Project.

Water would be backed up Richland Creek to Harris, Rutherford County, a station on the Carolina, Clinchfield & Ohio Railway, necessitating the relocation of a short length of track, and also up Green River (in Polk County) for a distance of 8.5 miles above State Highway No. 19 (now State Highway No. 108), an oil-treated, hard-surfaced road, the relocation of which is necessary. The upstream limit of maximum reservoir level in Broad River would be about 6 miles below the existing Lake Lure Dam (Rutherford County), with a fall of about 70 feet between. The development of this head would be costly on account of the required relocation of State Highway No. 20 (now State Highway No. 9). . .

The following data are pertinent to the Clinchfield Project:

Drainage area, square miles	538
Maximum estimated discharge, second-feet	87,000
Primary flow with storage, second-feet	825
Maximum height of earth dam, feet	152
Length of crest of dam, feet	2,880
Flow-line elevation, feet	820
Area of reservoir, acres	22,400
Total reservoir capacity, acre-feet	1,124,000
Flood storage capacity, acre-feet	104,700
Power storage capacity, acre-feet	573,600
Total power head, feet	135
Primary power, horsepower	10,000
Installed capacity, horsepower	23,500
Average output per annum, kilowatt-hours	73,985,000

Minor power projects - The District Engineer investigated and studied seven minor projects for his report contained in House Document No. 96, 73rd Congress, 1st Session. Two of these projects are located in North Carolina and the other five projects are located in South Carolina. The North Carolina sites are on the South Fork Catawba River, at Lincolnton, Lincoln County, and on the Catawba River at Cowans Ford about seven miles southwest of Davidson, Mecklenburg County. (Duke Power Company's Cowan Ford Project, under consideration by the Federal Power Commission, would not be classified as minor.)

Lincolnton Project - The dam site of this minor project is located on South Fork Catawba River, about 0.5 mile above the mouth of Clarks Creek near Lincolnton. The topography, with employment of dikes along the low ridges on the left bank of the river, permits a flow-line elevation of 830 feet.

The water surface of the river at this point is 750 feet, giving a head of 80 feet. South Fork Catawba River is formed by the confluence of Henry Fork and Jacob Fork (in Catawba County about 5.5 miles southwest of Newton), and backwater of the proposed project would extend about one mile up each of these two streams. The length of the crest of the main dam would be about 4,800 feet. Two dikes on the left bank would be required, one about 1,500 feet long and 40 feet maximum height, and the other a small dike approximately 450 feet long and 10 feet high.

Additional data pertinent to the Lincolnton Project are set forth below.

Drainage area, square miles	300
Primary flow with project storage, second-feet	330
Area of reservoir, acres	11,100
Total storage, acre-feet	310,800
Flood storage, feet	5
Flood storage, acre-feet	48,100
Power storage, feet	20
Power storage, acre-feet	160,900

Cowans Ford Project - The project is for an undeveloped head of 112 feet on Catawba River between the existing Mountain Island and Lookout Shoals plants of the Duke Power Company. The dam site is located a short distance below Ramsey Creek in Mecklenburg County (about seven miles southwest of Davidson) and at the head of backwater from the Mountain Island hydroelectric plant). The Duke Power Company now owns a large portion of the area of the reservoir site. There are railroad tracks (Southern Railway between Statesville and Newton) and two or three cotton mills within the zone to be flooded at the upper end of the site. The following data are pertinent to this project.

Drainage area, square miles	1,700
Flow-line elevation	760
Total head, feet	112
Area of reservoir, acres	19,800
Total storage, acre-feet	870,000
Project storage, second-feet	1,700
Capacity discharge, second-feet	5,000

Generation of Electric Power by Duke Power Company - Duke Power Company operates hydroelectric developments on the Catawba River in North Carolina at Bridgewater (Lake James), Rhodhiss (Lake Rhodhiss), Oxford (Lake Hickory), Lookout Shoals (Lookout Shoals Lake), and Mountain Island (Mountain Island Lake) Reservoirs, and on the Catawba-Wateree River in South Carolina at Catawba

(Catawba Lake), Fishing Creek, Great Falls, Cedar Creek, and Wateree Reservoirs. The Company applied to the Federal Power Commission for a license to construct a hydroelectric development at Cowans Ford, west of Davidson in Mecklenburg County, which would back water up the Catawba River from Mountain Island Lake to the tailrace of Lookout Shoals Dam. Pertinent data of the reservoir developments in North Carolina, in downstream order, are shown below.

Name	Bridgewater (L. James)	Rhodhiss	Oxford (L.Hickory)	Lookout Shoals		Cowans Ford	Mountain Island	Catawba
1st Year of Operation	1919	1925	1928	1915 lowered 1916		Proposed	1923	1904 raised 1925
Stream Mile (Dam)	275	239	222	213		179	164	139
Reservoir Length (Mi.)	14	18	17	7.8		33.6	15.2	24.4
Normal Elevation (Ft. MSL)	1,200	995	935	838		760	648	570
Minimum Elevation (Ft. MSL)	1,160	985	925	835		735	638	560
Maximum Head (Feet)	135	60	89.5	78		112	78	70
Maximum Drawdown (Feet)	40	10	10	3		25	10	10
Maximum Area (Acres)	6,510	3,515	4,110	1.270		29,760	3,235	12,455
Minimum Area (Acres)	3,322	2,325	3,280	1,160		17,670	2,025	9,203
Usable Volume (Acre-feet)	189,370	29,970	36,890	3,670		588,300	25,987	107,670
Normal Tail-water Elevation	1,065	935	845.5	760		648	570	500
Watershed Area (sq. mi.)	380	1,050	1,250	1,410		1,770	1,800	3,080
Intake Elevation Top	1,120	990	923	809.7		723	643	549
Bottom	1,105	957	884	787.7		648	606.5	510
Pool Surface to Intake	80	5	12	28.2		37	5	21
Height of Intake	15	33	39	22		75	37.5	39

Action on proposed Cowans Ford Project - Representatives of the U. S. Fish and Wildlife Service, the North Carolina Wildlife Resources Commission, the North Carolina State Stream Sanitation Committee, the North Carolina Department of Conservation and Development, and Duke Power Company were held on August 22, September 19, and November 5, 1957 with a view to including, in the project license, a provision under which minimum releases will be made from each of the dams in the system after construction of Cowans Ford Reservoir to provide ample downstream flow to satisfy the water requirements of other users as well as to provide water of such quality as will protect such uses.

The Federal and State agencies, indicated above, suggested to the Assistant General Counsel of Duke Power Company, on September 20, 1957, a stipulation to be included in the license which would accomplish the provision set forth in the preceding paragraph. At the conference on November 5, officials of the Company presented, to representatives of the agencies for consideration, a proposed revision of the agencies' suggested stipulation. This revision was accepted by the agencies. Duke Power Company's application to the Federal Power Commission for a license to construct the Cowans Ford Project was, as of August 1, 1958, under consideration by the Commission.

Other hydroelectric developments by Duke Power Company, listed in the North Carolina State Planning Board's 1937 "Report on Water Resources", are set forth below.

Name of Plant	Capacity in Horse Power	Type
Broad River Basin		
Turner	7,400	Hydro
Tuxedo	6,700	Hydro
Lake Lure	4,830	Hydro
Big Hungry No. 1	270	Hydro
Big Hungry No. 2	135	Hydro
Catawba River Basin		
Riverbend	147,500	Steam
Mt. Holly	20,120	Steam
Spencer	860	Hydro
Allspaugh	240	Hydro
Gunpowder No. 1	540	Hydro
Gunpowder No. 2	130	Hydro
Little River	670	Hydro
Catawba Falls No. 1	160	Hydro
Catawba Falls No. 2	240	Hydro
Toms Creek	100	Hydro
Lake Tahoma	320	Hydro

Recreation - Duke Power Company provides recreational opportunities as follows:

Lake James - Tourist camps, fishing, boating, and pavilions.
Lookout Shoals Lake - Fishing, boating, and camping.
Lake Hickory - Fishing, boating, and swimming.
Lake Rhodhiss - Fishing and boating.

Lake Tahoma, on N. C. Highway 80 east of the Blue Ridge Parkway at the confluence of Buck and Little Buck Creeks in Pisgah National Park, is crystal-

clear and spring-fed, mirrows majectic mountains, and provides fishing and boating.

Lake Adger on the Green River in Polk County along N. C. Highway 9 near Tryon, was constructed for generation of electric power, and provides fishing and boating.

Lake Kawana, on the Linville River in Avery County along the Blue Ridge Parkway at the Town of Linville, provides fishing and boating.

Lanier Lake, owned by Kilburn Mills at Tryon in Polk County, is located on the Pacolet River along U. S. Highway 176, has an area of 175 acres and a seven-mile shore drive, and provides water sports.

Lake Lure, on the Broad River in the northwestern corner of Rutherford County, is located along U. S. Highways 64 and 74 and north thereof, has a 27-mile shoreline, and provides resort facilities.

Lake Summit, on the Green River in Henderson County, is located about eight miles south of Hendersonville near U. S. Highway 25 at Tuxedo and provides fishing and boating.

Recreational activities in counties of the Catawba and Broad River Basins are available as indicated below.

Avery County - Swimming and trout fishing may be enjoyed at Linville (summer). The Daniel Boone Game Refuge, a 44,000-acre preserve, is stocked with deer and trout.

Burke County - Bass, bream, crappie, and catfish are found in Lake James. Lake Rhodhiss has large-mouth and small-mouth bass, crappie, bream, and catfish. Fishing in both of these lakes is year-around.

Caldwell County - Swimming is available at Lenoir. At Brown Mountain Beach on Wilson's Creek about 10 miles west of Lenoir, cottages, swimming, and fishing are provided. Bass, crappie, and catfish may be caught year-around in Oxford Lake, and boats are available at Lakeside Beach. Brown and rainbow trout are in Wilson's Creek near Edgemont and in other creeks.

Catawba County - Bass, crappie, and catfish in Oxford Lake, bass and crappie in Lake River, and bass and perch in Catawba River and its tributaries provide fishing opportunities.

Cleveland County - Shelby's municipal park and recreation plant includes a swimming pool, golf course, tennis courts, athletic fields, picnic areas, bowling alleys, and gymnasium. Bass and perch are found in Broad River and its tributaries.

Gaston County - The Gastonia County Club has two golf courses, a municipal swimming pool, and other recreational facilities. Picnicking and recreation grounds are located at a lake on Crowders Creek at Mountain View about six miles west of Gastonia. Bass and perch are found in the Catawba and South Fork Catawba Rivers.

Lincoln County - Swimming is available at the Lincolnton Country Club. Bass and perch are caught in South Fork Catawba River and its tributaries.

McDowell County - Little Switzerland, on the Blue Ridge Parkway near a

tributary of Armstrong Creek, is a summer resort. The Mt. Mitchell Wildlife Management Area has picnic facilities and a special trout stream for women only. The Old Fort Recreational Area offers picnicking facilities. Lake Refuge is located on a tributary of Swannanoa Creek near Old Fort. Swannanoa Creek is a tributary of Catawba River whereas Swannanoa River, not far away, lies in the French Broad River Basin. Large-mouth and small-mouth bass, crappie, bream, and carp are found in Lake James.

Polk County - Pearson's Falls, near Saluda, is a 400-acre preserve where are found all types of flora common to forests of eastern America. There are shelters, ovens, and tables for picnickers. Other interesting falls include The White Oak (Shunkawaken) and Ravens. The Piedmont Boy Scout Camp is on the west shore of Lake Lanier, at which fishing is available. Bass, crappie, and bream are found in Lake Adger. The Pascolet and Green Rivers contain rainbow trout.

Rutherford County - Bass, crappie, and bluegills, in Lake Lure, are best caught in April, June, and July. Boats are available at this lake. Rainbow and brown trout are found in Broad River. A fishing permit is required for part of this stream.

General - The area of the Broad and Catawba River Basins, combining large population-centers and varied topography consisting largely of hills, valleys, and mountain slopes, presents a great opportunity for recreational development. The Broad River Basin contains Kings Mountain National Park and the scenic and recreational center about Lake Lure and Chimney Rock. Since it extends to the crest of the Blue Ridge or adjacent ranges of the mountain front, there are many of the finest scenic resources to be found anywhere in the United States. This area has great scenic and recreational resources related to the water resources, which should be conserved and wisely developed as a playground, not only for the people of the basin but also for many others.

The State maintains four areas as game refuges or fish hatcheries, or both. Game in wide variety is fairly abundant over the Broad and Catawba River Basins.

Stream Flow Records - Mean monthly, maximum daily, minimum daily, and mean weekly discharges, all in million gallons per day, at 11 gaging stations on streams, and monthly change in contents in equivalent million gallons per day at seven Duke Power Company reservoirs, in the Broad and Catawba River Basins may be found in "Hydrologic Data on the Catawba and Broad River Basins, 1872-1945", prepared in cooperation with the Geological Survey, U. S. Department of the Interior, and the Weather Bureau, U. S. Department of Commerce, and published by the North Carolina Department of Conservation and Development in 1949. Stream-flow data for years subsequent to 1945, at the 11 gaging stations indicated above, and at gaging stations at Indian Creek near Laboratory (established August 20, 1951), at Long Creek near Bessemer City (established in December 1952), and at Lower Little River near All Healing Springs (established in 1952), are shown below. There are also shown below stream-flow data for gaging station at Elk Creek near Elk Park (not included in "Hydrologic Data on the Broad and Catawba River Basins, 1872-1945") which was established on October 9, 1934.

Broad River near Boiling Springs, Cleveland County

Location - Water-stage recorder, lat. 35°12'35", long. 81°41'55", half a mile upstream from Sandy Run Creek and 3½ miles southwest of Boiling Springs.

Drainage area - 864 square miles.

Records available - June 1925 to date.

Average discharge (June 1925 to December 1945 - 20 years, 913 million gallons per day.

Extremes (1925-1945) - Maximum discharge, 47,350 m.g.d. Aug. 16, 1928 (gage height, 24.3 feet, present datum); minimum 39 m.g.d. (regulated) July 21, 1940 (gage height, 1.06 feet).

Remarks - Considerable diurnal fluctuation and some regulation caused by power plant above station.

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly discharge (m.g.d.)	1090	875	1083	1403	1025	752	882	691	610
Mean monthly discharge (c.f.s.)	1687	1355	1677	2172	1586	1164	1366	1071	945
Maximum mean weekly discharge (m.g.d.)	3330	2660	3940	4020	2820	2490	3780	3150	4430
Maximum mean weekly discharge (c.f.s.)	5150	4120	6100	6220	4370	3850	5850	4340	6870
Minimum mean weekly discharge (c.f.s.)	770	585	773	1200	888	470	462	431	211
Minimum mean weekly discharge (m.g.d.)	492	378	499	775	574	304	298	278	136
Maximum daily discharge (m.g.d.)	11800	6560	9110	11600	8400	6460	10700	6010	12000
Maximum daily discharge (c.f.s.)	18200	10000	14100	18000	13000	10000	16500	9320	18600
Minimum daily discharge (m.g.d.)	300	246	351	553	373	211	175	185	68
Minimum daily discharge (c.f.s.)	465	381	544	856	578	327	271	286	105

Broad River near Chimney Rock, Rutherford County

Location - Water-stage recorder, lat. 35°25'35", long. 82°10'45", 1000 feet downstream from Lake Lure Dam and 3 miles east of Chimney Rock.

Drainage area - 97 square miles.

Records available - March 1927 to date. May 1907 to June 1909 at site at Uree, 1 1/8 miles downstream.

Extremes (1927-1945) - Maximum discharge, 16,800 million gallons per day Aug. 15, 1928 (gage height, 16.8 feet), by computation of flow over Lake Lure Dam; minimum discharge, 0.5 million gallons per day Sept. 13, 1928 (gage height, 0.26 foot).

Remarks - Large diurnal fluctuation caused by power plant above station. Low and medium flow largely regulated by Lake Lure.

	1946	1947	1948	1949	1950	1951	1952
Maximum monthly discharge (m.g.d.)	904	840	1050	2450	2720	331	982
Maximum monthly discharge (c.f.s.)	1400	1300	1630	3480	4210	513	1520
Mean monthly discharge (m.g.d.)	137	111	145	193	147	89.1	95.6
Mean monthly discharge (c.f.s.)	212	172	225	299	228	138	148
Minimum daily discharge (m.g.d.)	2.71	2.84	2.71	3.55	2.65	2.65	2.26
Minimum daily discharge (c.f.s.)	4.2	4.4	4.2	5.5	4.1	4.1	3.5
Maximum mean weekly discharge (m.g.d.)	397	413	394	717	801	225	336
Minimum mean weekly discharge (m.g.d.)	41	35	52	73	48	19	36
Maximum mean weekly discharge (c.f.s.)	615	639	610	1110	1240	348	520
Minimum mean weekly discharge (c.f.s.)	64	54	80	113	75	39	55

Catawba River near Marion, McDowell County

Location - Water-stage recorder, lat. 35°42'20", long. 82°02'10", at bridge on U. S. Highway 221, a quarter of a mile downstream from Tom Creek and 2¼ miles northwest of Marion.

Drainage area - 171 square miles, including area of first tributary below bridge which enters above control.

Records available - October 1941 to date.

Extremes - Maximum discharge, 5,300 m.g.d. Sept. 18, 1945; minimum discharge, 45 m.g.d. (regulated) Dec. 17, 1943, Sept. 8-11, 1944.

Remarks - Some diurnal fluctuation and slight regulation for short periods at low flow caused by power plants above station.

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly discharge (m.g.d.)	208	180	252	366	252	151	171	138	
Mean monthly discharge (c.f.s.)	322	278	390	567	390	233	265	214	187
Maximum mean weekly discharge (m.g.d.)	743	788	724	1510	1180	492	672	561	810
Maximum mean weekly discharge (c.f.s.)	1150	1220	1120	2340	1820	762	1040	868	1250
Minimum mean weekly discharge (m.g.d.)	67	61	81	178	107	44	57	33	22
Minimum mean weekly discharge (c.f.s.)	104	94	125	276	165	68	88	51	34
Maximum daily discharge (m.g.d.)	1940	1890	1710	5210	3320	1050	2220	2090	2550
Maximum daily discharge (c.f.s.)	3000	2930	2640	8060	5140	1620	3430	3240	3950
Minimum daily discharge (m.g.d.)	63	48	65	162	83	41	48	25	19
Minimum daily discharge (c.f.s.)	97	74	100	250	129	64	75	38	29

Catawba River at Catawba, Catawba County

Location - Water-stage recorder, lat. 35°42'50", long. 81°04'10", 10 feet downstream from bridge on U. S. Highway 70, a quarter of a mile upstream from Lyle Creek, half a mile upstream from Southern Railway bridge, and 1 mile northeast of Catawba. Datum of gage is 746.49 feet above mean sea level, datum of 1929, supplementary adjustment of 1936.

Drainage area - 1,535 square miles including that of Lyle Creek.

Records available - July 1896 to April 1902, November 1934 to date.

Average discharge - 13 years (1896-99, 1935-45), 1560 m.g.d.

Extremes - Maximum discharge: 114,300 m.g.d. Aug. 14, 1940 (gage height, 36.8 feet, from floodmarks), by computation of flow at Lookout Shoals power plant by Duke Power Co.; minimum: 69 m.g.d. (regulated) Nov. 9, 1941. Maximum stage known, 44.1 feet July 16, 1916, affected by failure of earth dike at Lookout Shoals Lake 4 miles above station (from levels by State Bridge Department).

Remarks - Results good except those below 646 m.g.d., which are fair. Records include discharge of Lyle Creek. Flow regulated by four reservoirs above station which have combined usable capacity of 14.975 billion cubic feet.

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly discharge (m.g.d.)	1549	1282	1690	2096	1399	1110	1251	1040	1074
Mean monthly discharge (c.f.s.)	2398	1984	2618	3245	2166	1718	1937	1612	1665
Maximum mean weekly discharge (m.g.d.)	6230	4240	4940	7110	2210	2050	4510	3540	2860
Maximum mean weekly discharge (c.f.s.)	9650	6570	7640	11000	3860	3180	6980	5570	4440
Minimum mean weekly discharge (m.g.d.)	415	517	289	924	123	121	531	459	119
Minimum mean weekly discharge (c.f.s.)	642	801	448	1430	191	188	822	712	184
Maximum daily discharge (m.g.d.)	12400	11600	9820	15600	3680	2890	11000	8900	12800

Catawba River at Catawba (cont'd.)

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Maximum daily discharge (c.f.s.)	19200	18000	15200	24200	5700	4470	17000	13800	19800
Minimum daily discharge (m.g.d.)	79	76	84	120	84	74	79	65	79
Minimum daily discharge (c.f.s.)	122	118	130	186	130	115	122	101	122

First Broad River near Lawndale, Cleveland County

Location - Water-stage recorder, lat. 35°22'50", long. 81°32'40", 500 feet downstream from dam at Double Shoals, an eighth of a mile upstream from Barnes Creek, and 2½ miles southeast of Lawndale.

Drainage area - 198 square miles.

Records available - February 1940 to date.

Extremes (February 1940 to December 1945) - Maximum discharge: 21,000 m.g.d. Aug. 14, 1940 (gage height, 37.8 feet), from rating curve extended above 5,360 m.g.d. on basis of records for stations on nearby streams; minimum: 10 m.g.d. June 23 and 30, 1940, July 25, 1943. Flood of July 1916 reached a stage of 37.8 feet, from reference marks established by local resident.

Remarks - Considerable diurnal fluctuation and slight regulation at low flow caused by power plants and mills above station.

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly discharge (m.g.d.)	196	176	242	256	144	123	183	143	135
Mean monthly discharge (c.f.s.)	303	273	374	396	223	190	284	221	210
Maximum mean weekly discharge (m.g.d.)	884	741	980	1348	531	651	909	932	1122
Maximum mean weekly discharge (c.f.s.)	1370	1150	1520	2090	829	1010	1410	1290	1740
Minimum mean weekly discharge (m.g.d.)	70.6	65.4	80.8	127	72.3	47.2	54.9	39.3	27.8
Minimum mean weekly discharge (c.f.s.)	108	100	125	196	112	73	85	61	43
Maximum daily discharge (m.g.d.)	4140	2580	2450	5570	1520	2730	4790	2350	3090
Maximum daily discharge (c.f.s.)	6410	4000	3790	8620	2350	4230	7410	3640	4780
Minimum daily discharge (m.g.d.)	59	52	43	103	62	42	48	34	14
Minimum daily discharge (c.f.s.)	91	80	66	160	96	65	75	52	23

Green River near Mill Spring, Polk County

Location - Water-stage recorder, lat 35°20'10", long. 82°04'50", 2 miles downstream from Walnut Creek and 5¼ miles northeast of Mill Spring.

Drainage area - 174 square miles.

Records available - December 1939 to date.

Extremes (December 1939 - December 1945) - Maximum discharge 6,970 m.g.d. Aug. 13, 1940 (gage height, 22.15 feet), by computation of flow over dam; minimum,

16 m.g.d. (regulated) July 6, 1940 (gage height, 1.42 feet). Maximum stage known, 24.2 feet sometime in July 1916, from flood-crest reference mark placed by local resident.

Remarks - Large diurnal fluctuation caused by power plants above station; considerable regulation by Lake Summit and Turner Reservoirs (combined usable storage, 264,455,000 cubic feet).

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly discharge (m.g.d.)	220	238	317	407	285	203	238	186	162
Mean monthly discharge (c.f.s.)	496	369	490	630	441	315	368	288	250
Maximum mean weekly discharge (m.g.d.)	1020	672	1120	1220	846	531	950	749	1247
Maximum mean weekly discharge (c.f.s.)	1580	1040	1740	1890	1310	822	1470	1160	1930
Minimum mean weekly discharge (m.g.d.)	147	101	135	204	156	57	68	36	37
Minimum mean weekly discharge (c.f.s.)	227	156	209	316	241	89	105	56	57
Maximum daily discharge (m.g.d.)	2050	1670	2580	3880	2910	969	3230	1815	3100
Maximum daily discharge (c.f.s.)	3170	2580	4000	6000	4500	1500	5000	2810	4800
Minimum daily discharge (m.g.d.)	32	19	34	41	35	23	28	25	19
Minimum daily discharge (c.f.s.)	50	30	52	73	54	35	44	38	29

Henry Fork near Henry River, Burke County

Location - Water-stage recorder, lat. 35°41'05", long. 81°24'05", 400 feet downstream from highway bridge on county road at Old Link Ford, 1¼ miles downstream from Catawba-Burke County line, and 2 miles downstream from Village of Henry River.

Drainage area - 80 square miles

Records available - July 1925 to November 1932, December 1941 to date.

Extremes (July 1925 to November 1932, December 1941 to December 1945)- Maximum discharge, 9,900 m.g.d. Oct. 2, 1929 (gage height, 18.40 feet, site then in use); minimum: 1.9 m.g.d. (regulated) Dec. 20, 1942. Maximum discharge height, 29.2 feet, site then in use, from floodmarks), by computation of flow over dam at Henry River.

Remarks - Considerable diurnal fluctuation and some regulation caused by mill above station. About 3 m.g.d. are diverted for water supply by City of Morganton and Morganton State Hospital and wasted into Catawba River.

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly discharge (m.g.d.)	93.7	95.6	111	115	69.1	58.1	82.7	78.2	70.4
Mean monthly discharge (c.f.s.)	145	148	172	178	107	89.9	128	121	109
Maximum mean weekly discharge (m.g.d.)	328	891	537	508	350	240	369	338	510

Henry Fork near Henry River (con'd.)

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Maximum mean weekly discharge (c.f.s.)	507	1380	831	787	542	372	571	523	790
Minimum mean weekly discharge (m.g.d.)	31	28	36	53	26	11	28	25	13
Minimum mean weekly discharge (c.f.s.)	48	44	56	82	40	17	43	39	20
Maximum daily discharge (m.g.d.)	1220	5120	2770	1660	1290	982	1650	1220	2130
Maximum daily discharge (c.f.s.)	1890	7930	3520	2570	2000	1520	2560	1890	3290
Minimum daily discharge (m.g.d.)	3.88	3.88	4.8	27	6.5	3.88	3.88	4.91	4.7
Minimum daily discharge (c.f.s.)	6	6	9	42	10	6	6	7.6	7.2

Indian Creek near Laboratory, Lincoln County

Water-stage recorder installed Aug. 20, 1951.

Drainage area - 68.4 square miles.

	1942	1953	1954
Mean monthly discharge (m.g.d.)	64.0	42.0	36.1
Mean monthly discharge (c.f.s.)	99.0	65.2	56.0
Maximum daily discharge (m.g.d.)	2420	716	1445
Maximum daily discharge (c.f.s.)	3750	1110	2240
Minimum daily discharge (m.g.d.)	12	9.7	3.3
Minimum daily discharge (c.f.s.)	18	15	5.2
Maximum mean weekly discharge (m.g.d.)	397	223	402
Maximum mean weekly discharge (c.f.s.)	614	345	623
Minimum mean weekly discharge (m.g.d.)	14	10	4.1
Minimum mean weekly discharge (c.f.s.)	21	16	6.3

Linville River at Branch, Burke County

Location - Water-stage recorder, lat. 35°47' 50", long. 81°53'20", at highway bridge at Branch, a quarter of a mile upstream from Lake James.

Drainage area - 65 square miles.

Records available - June 1922 to date.

Average discharge (June 1922 to December 1945) - 23 years, 89 m.g.d.

Extremes (June 1922 to December 1945) - Maximum discharge, 25,500 m.g.d. Aug. 13, 1940 (gage height, 11.4 feet), by slope-area method; minimum 1.9 m.g.d. Jan. 2, 1940, result of low temperature. Flood of July 1916 reached a stage slightly lower than that of Aug. 13, 1940.

Remarks - Small diurnal fluctuation caused by mill above station.

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly discharge(m.g.d.)	87.2	101	103	141	91.7	64.6	74.3	78.8	70.4
Mean monthly discharge (c.f.s.)	135	157	160	218	142	100	115	122	109
Maximum mean weekly discharge (m.g.d.)	497	578	384	756	592	307	429	436	415

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Maximum mean weekly discharge (c.f.s.)	770	895	594	1170	917	475	664	675	642
Minimum mean weekly discharge (m.g.d.)	17	21	26	21	21	12	14	11	9
Minimum mean weekly discharge (c.f.s.)	27	33	41	63	32	18	21	17	14
Maximum daily discharge(m.g.d.)	1280	1630	930	2580	2140	638	1530	1420	1280
Maximum daily discharge (c.f.s.)	1980	2520	1440	4000	3310	987	2370	2200	1980
Minimum daily discharge (m.g.d.)	14	17	19	36	18	11	9.7	8.4	8
Minimum daily discharge (c.f.s.)	22	26	29	55	28	17	15	13	13

Little Sugar Creek near Charlotte, Mecklenburg County

Location - Water-stage recorder and concrete control, lat. 35°09'15", long. 80°51'10", just upstream from sewage-disposal plant of City of Charlotte, a quarter of a mile downstream from Briar Creek, and 5 miles south of Charlotte. Datum of gage is 571.6 feet above mean sea level (City of Charlotte datum).

Drainage area - 41.4 square miles.

Records available - July 1924 to date.

Extremes (July 1924 to December 1945) - Maximum discharge, 5,400 m.g.d. Apr. 6, 1936 (gage height, 16.2 feet, from flood-marks), from rating curve extended above 1,300 m.g.d.; minimum 1.0 m.g.d. July 30, Aug. 1, 1925.

Remarks - Records good except those below 6.5 m.g.d., which are fair.

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly discharge (m.g.d.)	25.2	33.3	42.3	37.7	19.0	18.1	31.2	25.1	23.0
Mean monthly discharge (c.f.s.)	39.0	51.5	65.5	58.3	29.4	28.0	48.3	38.9	35.6
Maximum mean weekly discharge (m.g.d.)	120	185	244	189	61	131	251	139	152
Maximum mean weekly discharge (c.f.s.)	186	287	378	293	95	203	389	215	266
Minimum mean weekly discharge (m.g.d.)	4.78	4.20	4.52	9.0	4.84	3.68	4.78	3.6	1.81
Minimum mean weekly discharge (c.f.s.)	7.3	6.5	7.0	14	7.3	5.7	7.4	5.6	2.80
Maximum daily discharge (m.g.d.)	581	646	1010	969	181	393	1340	531	853
Maximum daily discharge (c.f.s.)	900	1000	1570	1500	280	609	2080	823	1320
Minimum daily discharge (m.g.d.)	3.94	3.49	2.91	8.4	3.23	1.94	3.81	2.8	1.29
Minimum daily discharge (c.f.s.)	6.1	5.4	4.5	13	5.0	3.0	5.9	4.4	2.0

Long Creek near Bessemer City, Gaston County

Water-stage recorder installed Dec. 12, 1952.

Drainage area - 31.4 square miles.

	1953	1954
Maximum monthly discharge (m.g.d.)	333	309
Maximum monthly discharge (c.f.s.)	517	479
Mean monthly discharge (m.g.d.)	17.2	14.2
Mean monthly discharge (c.f.s.)	26.7	22.0
Minimum monthly discharge (m.g.d.)	2.5	0.5
Minimum monthly discharge (c.f.s.)	3.8	0.8
Maximum mean weekly discharge (m.g.d.)	95	88
Maximum mean weekly discharge (c.f.s.)	148	137
Minimum mean weekly discharge (m.g.d.)	3.3	0.88
Minimum mean weekly discharge (c.f.s.)	5.1	1.36

Lower Little River near All Healing Springs, Alexander County

Water-stage recorder established Dec. 31, 1952.

Drainage area - 31.2 square miles.

	1953	1954
Mean monthly discharge (c.f.s.)	25.3	20.8
Mean monthly discharge (g.p.d.)	16.3	13.4
Maximum daily discharge (c.f.s.)	251	594
Maximum daily discharge (g.p.d.)	162	383
Minimum daily discharge (c.f.s.)	7.2	3.4
Minimum daily discharge (g.p.d.)	4.6	2.2
Maximum mean weekly discharge (c.f.s.)	94	146
Maximum mean weekly discharge (g.p.d.)	61	94
Minimum mean weekly discharge (c.f.s.)	8.0	3.76
Minimum mean weekly discharge (g.p.d.)	5.2	2.42

Second Broad River at Cliffside, Rutherford County

Location - Water-stage recorder, lat. 35°14'15", long. 81°46'25", at Cliffside, 2 miles upstream from mouth.

Drainage area - 211 square miles.

Records available - June 1925 to date.

Average discharge (1925-1945) - 20 years, 191 m.g.d.

Extremes (1925-1945) - Maximum discharge, 9,690 m.g.d. Aug. 18, 1940 (gage height, 17.93 feet), by computation of flow over dam; minimum 2.58 m.g.d. (regulated) July 24, 1943.

Records - Considerable diurnal fluctuation and some regulation caused by mills above station.

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly discharge (m.g.d.)	223	180	217	241	173	151	186	145	137
Mean monthly discharge (c.f.s.)	345	278	336	373	268	234	288	225	212
Maximum mean weekly discharge (m.g.d.)	891	904	904	1110	775	691	943	704	1270
Maximum mean weekly discharge (c.f.s.)	1380	1400	1400	1720	1200	1070	1460	1090	1960
Minimum mean weekly discharge (m.g.d.)	93	61	78	108	93	41	64	45	27
Minimum mean weekly discharge (c.f.s.)	144	95	120	167	144	64	99	70	42
Maximum daily discharge (m.g.d.)	3210	3490	2470	3570	2910	1880	2950	1560	3890

Second Broad River at Cliffside (cont'd.)

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Maximum daily discharge (c.f.s.)	4970	5400	3830	5530	4510	2910	4560	2420	6010
Minimum daily discharge (m.g.d.)	28	9.0	29	17	50	14	21	9.7	6.5
Minimum daily discharge (c.f.s.)	44	14	45	26	78	22	33	15	10

South Fork Catawba River at Lowell, Gaston County

Location - Water-stage recorder, lat. 35°17'05", long. 81°06'00", on county highway, just downstream from Howsers Creek, 1 mile north of Lowell. Datum of gage is 603.10 feet above mean sea level, datum of 1929, supplementary adjustment of 1936.

Drainage area - 630 square miles.

Records available - January 1942 to date.

Extremes (January 1942 to December 1945) - Maximum discharge, 1,420 m.g.d. Sept. 19, 1945; minimum discharge, 28 m.g.d. Sept. 10, 1944. Maximum stage known, 21.33 feet in August 1940, from floodmarks.

Remarks - City of Gastonia diverts about 1.9 m.g.d. for water supply.

	1946	1947	1948	1949	1950	1951	1952	1953	1954
Mean monthly discharge (m.g.d.)	589	539	627	634	373	336	567	416	375
Mean monthly discharge (c.f.s.)	912	834	970	981	578	520	878	644	581
Maximum mean weekly discharge (m.g.d.)	2470	2150	2560	2280	827	2020	2780	1780	3540
Maximum mean weekly discharge (c.f.s.)	3820	3330	3970	3530	1280	3130	4310	2760	5480
Minimum mean weekly discharge (m.g.d.)	207	169	198	275	122	96	136	127	47
Minimum mean weekly discharge (c.f.s.)	320	261	307	425	189	149	211	197	73
Maximum daily discharge (m.g.d.)	7040	4510	5480	4940	1790	5120	10700	3660	8010
Maximum daily discharge (c.f.s.)	10900	6980	8480	7640	2770	7930	16600	5660	12400
Minimum daily discharge (m.g.d.)	156	147	147	180	84	59	79	94	20
Minimum daily discharge (c.f.s.)	242	228	227	279	130	92	122	146	31

General - Generally speaking, ground water is available at all points throughout the area covered by the Broad and Catawba River Basins. The ground water, derived from the underlying rock-formations, is usually good in character and readily adapted to domestic or industrial use. Data regarding developed ground-water supplies for municipal and industrial use may be found in Chapters II and IV, respectively, of this publication. The number of supplies, derived from ground water, would probably be greater were it not for the fact that there is an abundance of surface water, available and easily accessible to most parts of the basin.

Statesville Area - Information regarding ground water in Alexander and Catawba Counties may be found in "Bulletin Number 68, Geology and Ground Water in the Statesville Area, North Carolina, by Harry E. LeGrand, Geologist, U. S. Geological Survey", prepared cooperatively by the Geological Survey, U. S. Department of the Interior, and published by the North Carolina Department of Conservation and Development in 1954. The Statesville Area includes Alexander, Catawba, Iredell, Davie, Rowan, and Davidson Counties.

Most of the area of Alexander County lies in the Catawba River Basin. The drainage in the northeastern part of the county is southeastward to the South Yadkin River. Catawba County lies entirely within the Catawba River Basin. Most of the area of Iredell County lies in the Yadkin River Basin. Although the Catawba River flows along the southwestern boundary, only about 15 percent of the 119 wells listed on pages 43 and 44 of Bulletin No. 68 are in the Catawba River Basin. Davie, Rowan, and Davidson Counties lie wholly within the Yadkin River Basin.

The following material is extracted from Bulletin Number 68.

Alexander County - All water supplies in the county are obtained from wells and springs. Dug and bored wells, and springs, are used extensively in the rural areas. Springs, most of which yield less than 5 gallons a minute, are common, especially in the mountainous areas west and north of Taylorsville. (Records of 38 wells in Alexander County are shown on page 27 of Bulletin No. 68).

Although some rocks, and some parts of the county, doubtless are capable of yielding more water to wells than others, detailed information on these points was not obtained. Drilled wells are not common enough to reveal the water-bearing characteristics of the rocks. However, because the area southeast of Taylorsville has a deeper layer of soil and weathered rock than the mountainous area in the remainder of the county, it is probably more favorable for large-yielding wells. This is suggested by the fact that the average yield of nine municipal and industrial wells in this area is about 67 gallons a minute; however, this average is high because three wells, owned by the Town of Taylorsville, yield 300, 125, and 80 gallons a minute, respectively.

Ground-water conditions in Alexander County are probably typical of those in the Statesville Area in general, though slightly less favorable than the average. There may be a great contrast in yield of wells locally as a result of the hilly and mountainous topography, the wells on hills yielding small amounts and wells on lower topographic features yielding large amounts of water. Factors that affect yield unfavorably are the relative thinness of the residuum and the abundance of relatively-insoluble rocks, in which the enlargement of fractures by solution is retarded. A favorable factor is the prevalence of highly-schistose rocks, containing coarse sand and gravel, which are probably capable of furnishing large

amounts of water to wells; however, it seems unlikely that these sources of water will be developed in the near future because they are not near rail lines and population centers.

Most of the ground water in Alexander County is of excellent chemical quality. Of the three samples of well water analyzed, only one contained as much as 105 parts per million of dissolved solids. In view of the relatively-insoluble rocks and the relatively-rapid circulation of water through the rocks, water of low mineral content is to be expected.

Catawba County - With the exception of the municipal supplies of Hickory and Newton, all domestic-water supplies come from wells and springs, but principally from wells. Four towns, many industries, and most of the rural people use water from wells. Several hundred wells, 6 inches or more in diameter, have been drilled, of which 326 are listed in the well tables. (Records of wells used by municipalities and industries may be found in Chapters II and IV, respectively, hereinbefore. Other records of wells may be found on pages 32-36, inclusive, of Bulletin Number 68.)

The rocks, at most places in Catawba County, are strongly foliated and fractured. The percolation of water downward through the fractures has resulted in the formation of a layer of residual, weathered material and soil at the land surface, and the enlargement of the fractures in the bedrock by solution as water moves downward and laterally through fractures to discharge points in the valleys. The more soluble rocks, such as horneblende gneiss and limestone, have larger fractures and a thicker cover of soil and weathered material than the less soluble rocks such as granite, granite gneiss, and quartzite. Generally speaking, the belt of hornblende gneiss, extending northeastward through the center of the county, has the best wells. However, no extensive area seems especially poor.

The characteristics of individual wells are similar to those of other counties in the Statesville Area. Topography, as well as geology, affects the yields. Wells on hills have a large range in yield, although generally they are poor. The broad upland areas, underlain by hornblende gneiss, yield more water to wells than areas underlain by other rocks; in fact, yields of 35 gallons a minute are not uncommon from wells penetrating hornblende gneiss on hills.

The yields of many of the wells in Catawba County were measured by means of bailer tests. These bailer tests, seldom exceeding two hours, give an indication of the relative yields, especially for low-yielding wells, but they do not give nearly as accurate results as do pumping tests of greater duration. Correspondingly, many of the pumping levels listed are not absolutely accurate.

Complete chemical-analyses were made of 17 samples of well water in the county. The analyses indicate that the ground water is of good chemical-quality. The concentration of dissolved solids in all samples was less than 77 parts per million, and, in nine samples, less than 100 parts per million. Only three samples contained as much as 0.4 part per million in iron. Other mineral matter is correspondingly low.

The average temperature of the ground water is about 60° F.

Charlotte Area - Information regarding ground water in Cleveland, Gaston, Lincoln, Mecklenburg, Polk, and Rutherford Counties may be found in "Bulletin No. 63, Geology and Ground Water in the Charlotte Area, North Carolina, by H. E. LeGrand and M. J. Mundorff, Geologists, U. S. Geological Survey", prepared cooperatively by the Geological Survey, U. S. Department of the Interior, and published by the North Carolina Department of Conservation and Development in 1952. The

Charlotte Area includes Cabarrus County, which lies in the Yadkin River Basin, in addition to the six counties indicated above. The northeastern part of Mecklenburg County also lies in the Yadkin River Basin. Gaston and Lincoln Counties and the western part of Mecklenburg County lie in the Catawba River Basin, and the other three counties in the Charlotte Area are drained by the Broad River and its tributaries.

The following material is extracted from Bulletin No. 63.

Cleveland County - Most of the domestic supplies, many of the industrial supplies, and three of the smaller municipal-water supplies are obtained from wells. A few domestic supplies are obtained from springs.

Most of the domestic supplies come from dug wells ranging from about 20 to 60 feet in depth. The depth to which these wells are dug is governed by the depth of the water table or the depth to solid rock. The wells are generally dug a few feet below the water table to insure an adequate supply of water in long, dry seasons when the water table drops. Where solid rock lies above the water table, dug wells are not successful unless the well can be excavated in the rock to the water table.

Records of more than 130 drilled wells were obtained in Cleveland County (see pages 40 and 43-46, inclusive, Bulletin No. 63), although complete information about many of them is lacking. The average yield is 24.2 gallons a minute. This is almost 6 gallons a minute more than the average of all wells in the Charlotte area.

Virtually all wells in Cleveland County penetrate granite or mica schist (see Table II on page 41, Bulletin No. 63). As these rocks are closely interlayered in most places, it is probable that many wells were drilled into both rocks. Although records do not indicate that beds of hornblende gneiss were penetrated in wells, their common occurrence suggests that many wells were drilled into them. The schist is a good water-bearing rock, as the average yield of 25 gallons a minute indicates. The granite is also considered to be a good water-bearing rock where a zone of decomposed rock mantles the solid rock. The granite disintegrates into granules of feldspar and quartz that make a porous surface layer capable of absorbing precipitation readily.

The limestone and quartzite, occurring in the southeastern part of the county, are not important as water bearers because of their limited occurrence. As the limestone is a dense, fractured rock containing no interconnecting caverns, it probably does not differ much from other rocks of the county as far as ground water is concerned. The quartzite generally forms pronounced ridges from which runoff is a relatively-large percentage of the precipitation, and the consequent influent seepage is small. However, wells that are drilled into the quartzite along its lower slopes may obtain moderate to large supplies and, under certain conditions, flowing wells may be realized.

Gaston County - Most of the domestic water-supplies, many of the industrial supplies, and two of the municipal supplies in Gaston County are obtained from 242 wells (see map showing location of wells, and records of wells, on page 50 and pages 52-57, inclusive, respectively, Bulletin No. 63). Most of the water in rural sections comes from dug wells that derive water from the weathered and disintegrated zone between the soil and the underlying, unweathered rock. Where the unweathered rock lies near the surface, difficulty may arise in digging a well deep enough to obtain a dependable well. The failure of dug wells is not confined to any one rock type although attempts to dig wells on upland areas, underlain by quartzite, are likely to be unsuccessful.

Although the wells in the table on page 49, Bulletin No. 63, were drilled in schist and granite, some of the wells probably penetrated other types of rock also. As the spacing between the different rocks can be measured in terms of feet and inches, it is inevitable that many wells pass through rocks other than that indicated at the top of the well. The schist is composed of muscovite and quartz in most places, but it may contain beds of hornblende gneiss and schist, pegmatites, and other rocks.

The table indicates that the average depth of wells in schist is 180 feet and that the average yield is 23 gallons a minute; this compares with an average depth of 165 feet in granite and an average yield of 18 gallons a minute. If average yield per foot of well is considered, the water-yielding characteristics of the schist is only slightly greater than that of granite. The average yield of wells in both schist and granite is 21 gallons a minute, which is four gallons a minute higher than the average for all wells in the Charlotte Area. It is not certain that the higher yield of wells in Gaston County is significant, because the same general geology and topography occur also in Lincoln and Cleveland Counties.

The part of the table, showing the relation of average yield and average yield per foot of well to the topography, is significant. Wells located on hills have by far the smallest average yield and average yield per foot of well. In addition, seven per cent of the wells on hills in the county yield one gallon a minute or less. As is the case in the Charlotte Area as a whole, the wells on hills yield only about half as much water per foot of well as wells in draws.

Analyses of samples of water from nine wells and one spring in Gaston County are given in a table following the well records (page 57, Bulletin No. 63). All but well 97 penetrated schist or granite or both schist and granite. Well 97 penetrated both granite and diorite. The water ranged in hardness from 26 to 158 parts per million. The iron content ranged from 0.08 to 8.6 parts per million. Water from different wells in the towns of Cherryville and Stanley showed a considerable local variation in content of iron.

Analysis of water from one spring is shown in the table referred to above. The water contained only 59 parts per million of dissolved solids, despite the fact that it flows from hornblende gneiss, one of the most readily-soluble rocks of the Charlotte Area. The low mineral-content of this spring water is thought to be typical inasmuch as water from springs normally flows through the rocks more rapidly than water from wells.

Temperatures of waters ranged from 60° to 66° F. and averaged 62° F. The water, having a temperature of 66° F., is pumped from a well 1,053 feet deep.

Lincoln County - Nearly all domestic water-supplies, and a part of the sole municipal water-supply (Town of Lincolnton), are obtained from wells, of which 111 are shown on the map, showing location of wells, and records of wells (page 60 and pages 63 to 65, inclusive, Bulletin No. 63).

Dug wells are used for most domestic purposes. They generally range in depth from about 20 to 60 feet. The deep weathering of the schist and granite allow most wells to be dug deep enough to furnish a satisfactory water supply throughout the year.

Most of the wells, listed in the records of wells referred to above, are for private use although some are for industrial and municipal use. Nearly all wells penetrate schist or granite, the relative merits of the wells in these

rocks being shown in Table 12 on pages 61 and 62, Bulletin No. 63.

The average yield of wells in schist is about 14 gallons a minute, almost twice as much as the average yield of wells in granite. However, the average depth of wells in schist is also somewhat greater so that the difference in average yield per foot of well between these rocks is not so great. The average yields of wells in both schist and granite are considerably less than those in the same rocks in Cleveland and Gaston Counties and are also less than the average for all schists and granite in the Charlotte Area. It is apparent that the low average yields are due, in part, to the fact that a majority of the wells in the table referred to above represent domestic wells that are not designed for large yields and that may not have been tested at their maximum capacity. The average yield is almost doubled if only the 27 wells drilled for industrial, municipal, and school use are considered; the average for these wells is 23 gallons a minute.

As in other counties, topographic location has an important bearing on the yield of wells. The 36 wells, drilled on hills, have an average yield of only half that of wells drilled in draws, and the difference in the average yield per foot of well is more marked. Wells in draws average 114 feet in depth and 23 gallons a minute in yield, whereas wells on hills average 157 feet and 11 gallons a minute, respectively. It is evident from the table that draws represent the best location in which to drill wells.

Analyses of water samples from four wells are given in the table on page 65, Bulletin No. 63. Two of these wells penetrated schist, and two penetrated granite. The water is of good quality, which is to be expected as both schist and granite contain relatively insoluble mineral-constituents. Where wells penetrate hornblende gneiss, either as thin sheet-like bodies in the mica schist and granite or as large bodies covering several feet, the water may contain more dissolved solids. The field tests for hardness of water, which were made on samples from most wells, indicated that the waters from nearly all localities are soft. The average hardness is slightly less than 50 parts per million.

The average temperature of well water is 60 F.

Mecklenburg County - Nearly all domestic water-supplies and three municipal water-supplies are obtained from wells (see map showing locations of, and table of data for, 242 wells on page 68 and pages 71 to 78, inclusive, Bulletin No. 63).

Dug wells are extensively used for domestic supplies in rural districts. Normally, they are from about 15 to 50 feet deep and $2\frac{1}{2}$ to 4 feet in diameter. As these wells cannot easily penetrate hard rock, they generally yield adequate water as long as the water table does not fall below the surface of the hard rock, or more specifically as long as the water table does not fall below the bottom of the well. Where the bedrock lies at or near the surface, as in much of the area underlain by diorite and gabbro in the southwestern part of the county, wells may not be dug deep enough to prevent them from going dry during long periods of dry weather.

Many of the wells in the rural areas were core-drilled with chilled shot and are two or three inches in diameter. Their cheapness makes them suitable for domestic use but, inasmuch as seven or eight gallons a minute is the maximum rate at which water can be removed from a 2-inch well by a deep-well pump, they are not generally used where large supplies of water are desired. Most industrial and public-supply wells are drilled with a percussion drill and are from four to eight inches in diameter. The large-diameter wells might encounter fractures and

cracks that are missed by small-diameter wells. Also, more water can be pumped from a large-diameter well and pumps with greater capacities can be installed in the larger wells.

The rocks, penetrated by wells in Mecklenburg County, are chiefly granite and diorite. The gabbroid rocks, occurring mostly in the southwestern part of the county, are included, for the purposes of ground-water description, with the diorite. A few wells in the eastern part of the county are drilled in slate, but complete data on these wells are lacking. As the diorite and granite are rather closely intermingled, some wells doubtless penetrate both rocks. Table 13 on pages 69 and 70, Bulletin No. 63, presents characteristics of the wells as related to rock types and topographic locations. According to this table, wells in diorite have greater yield and average yield per foot of well than wells in granite. The average yield of all diameters, for which information is available, in diorite, is 17.9 gallons a minute as compared with an average of 11.5 gallons a minute for wells in granite. If only 3-inch and larger wells are considered, those in diorite yield 22.6 gallons a minute and those in granite 14.8 gallons a minute.

Although granite occurs extensively throughout the county, the data on wells do not indicate that it yields more water at one place than another, if topography is disregarded. The same condition holds true for the diorite. According to topographic location, wells on hills yield less water than wells on any other topographic site, yielding only .068 gallons a minute per foot of well. Thus, wells in draws have an average depth of 144 feet and an average yield of 24.9 gallons a minute. The average yield might be appreciably higher if only 3-inch and larger wells were considered.

As no particular part of the county can be designated as unusually poor and no part as exceptionally good, it appears advisable to give considerable attention to local conditions in locating a well. West of the slate belt, diorite, the best aquifer, occurs sporadically in almost every square mile. Thus, in many cases it is possible to locate a well in the dark-colored diorite or gabbro without sacrificing convenience of location. As topography is an important consideration, the location of wells in lowlands, or specially in draws, should be atempted if relatively-large yields are desired.

The quality of ground water in Mecklenburg County is good almost everywhere (see table on page 77, Bulletin No. 63). Analyses of wells, penetrating granite in Mecklenburg County, vary considerably in the concentration of dissolved mineral-solids. This is doubtless due to the penetration of one or more small bodies of dioritic material in the granite. By virtue of their relatively-insoluble mineral constituents, the granites should contain water lower in mineral matter. Analyses of water from wells 27, 133, and 180, table referred to above, suggest that, although the predominant rock is granite, a large part of the mineral matter in solution comes from dioritic or mafic bodies penetrated by the wells.

Well 235, at Pineville, drilled in a large area of dark-colored gabbroid rocks, yields water containing 395 parts-per-million dissolved solids. Although this water is considered more or less typical of that in gabbro-diorite, it is doubtful if any of the ground waters in the county greatly exceed this in mineral matter; most of the ground waters should contain much less.

Temperatures range from 59° to 63° F. and average 61° F.

Polk County - A great variety of ground-water conditions occur in Polk

County owing to the rugged topography that prevails. Ground-water supplies are furnished by dug wells, springs, and drilled wells (see map showing location of, and records of data for, 24 wells on pages 78 and 81, respectively, Bulletin No. 63). Because the county is mostly rural, dug wells and springs are the most common sources of water. Springs are exceedingly common, especially in the northern and western parts of the county. Most of the springs yield less than four gallons a minute but, according to reports, there is no appreciable fluctuation in their flows. The springs are located along steep slopes, such as in coves, where surface topography has a steeper slope than the water table and transects it. Under these conditions, the springs occur only where the soil zone is absent or thin enough to allow water to flow out in concentrated seepage.

The wells, listed on the records referred to above, comprise 21 drilled wells and three dug wells. The drilled wells range in depth from 28 to 400 feet and in yield from one to 25 gallons a minute.

It is difficult to say what rock is the best water-bearing unit in the county. So closely interlayered are most of the rocks that many wells penetrate one or more layers of different rocks. All the rocks are extensively fractured, and they probably rate above the average in their water-bearing qualities.

Topography is an important factor in the yield of wells in Polk County. Of 10 drilled wells located on hills, only two yield as much as 15 gallons a minute. On the other hand, of four wells in valleys all yield 15 gallons a minute or more.

A number of streams in Polk County have rather-wide flood plains. Several wells have been drilled for individuals in the valley of the Pacolet River, near Tryon. The flood-plain materials penetrated were reported by the well owners as having a thickness ranging from 20 to 60 feet, with several reporting sand and gravel at the base of the alluvium. Other streams in the county, containing flood-plain deposits along parts of their courses, are Green River, White Oak Creek, and Walnut Creek. Satisfactory water-supplies may be obtained from these deposits, especially where recharge from the streams, through the permeable materials to the wells, is possible.

The quality of the ground water (see page 81, Bulletin No. 63) is very good. Dissolved solids are generally less than 100, and the hardness less than 25, parts per million.

Rutherford County - Practically all domestic water-supplies, many industrial supplies, and two public-water supplies (Towns of Lake Lure and Chimney Rock) are obtained from wells and springs in Rutherford County (see map showing location of, and records for, 77 wells on page 84 and pages 85-86, inclusive, Bulletin No. 63). Dug wells and springs are used extensively in the rural areas. Springs are very common in all but the southeast corner of the county. The yield of most springs is less than five gallons a minute.

Although some rocks of the county doubtless yield more water to wells than other rocks, this was not ascertained. Other factors related to yield of wells, such as topography and thickness of soil mantle, tend to counter and conceal the importance of rock type as a factor.

The populated area, east and south of Rutherfordton, is considered to be an area in which wells are generally successful. This area is less mountainous than the remainder of the county; consequently, there is somewhat less surface runoff and more direct influent seepage of water into the soil and rocks. However, the soil mantle is generally thicker in the southeastern part of the county, resulting

in greater storage-space for ground water. The consolidated rocks are intermixed and highly variable in character. Consequently, joints and parting planes, along which water moves, are abundant. Many of the industrial wells in this area yield as much as 50 gallons a minute, and one well yields 250 gallons a minute.

In the remainder of the county, no large-scale use is made of ground water. Springs and dug wells furnish adequate supplies for this, the rural area.

Most of the ground waters in Rutherford County are of excellent quality. Of the seven samples analyzed (see table on page 87, Bulletin No. 63), none contained as much as 100 parts per million of dissolved solids. In some places where the water is not derived from granite, it may contain objectionable amounts of iron, although these conditions are not believed to be common. The low mineral content in the waters is probably due to the common presence of granite from which ground water does not readily extract mineral matter, and also to the relatively-rapid movement of ground water and, consequently, to the short time it is in contact with rock surfaces.

Public Water Supplies - Descriptions and chemical character of public supplies of water, both surface water and ground water, are contained in Chapter II of this publication.

Chemical Character of Surface Waters - The following material, taken from Bulletin 52, Volumes 1-12, inclusive, published by the North Carolina Department of Conservation and Development and prepared cooperatively by the Geological Survey, U. S. Department of the Interior, comprises analyses of samples of surface waters in the Broad and Catawba River Basins in North Carolina, collected, during the period from October 1, 1944 to September 30, 1956, daily for some stations and monthly for other stations, at or near points where continuous stream-measurement stations were maintained. In addition to the daily and monthly samples, samples were also collected periodically at miscellaneous stream-measurement sites. This additional data made it possible to predict the chemical character of the streams at various points within the Broad and Catawba River Basins.

Armstrong Creek at Sevier, McDowell County

Date	Jan. 23, 1947	Bicarbonate	12
Color	6	Sulfate	2.9
pH	7.3	Chloride	1.0
Silica	7.3	Fluoride	0.1
Iron	0.05	Nitrate	0.3
Calcium	2.6	Dissolved solids	24
Magnesium	1.1	Total hardness	11
Na + K	1.7		

Ball Creek near Catawba, Catawba County

Date	3-9-48	Bicarbonate	14
Color	4.0	Sulfate	2.4
pH	6.9	Chloride	1.6
Silica	10	Fluoride	0.1
Iron	0.02	Nitrate	0.3
Calcium	2.7	Dissolved solids	32
Magnesium	1.3	Total hardness	12
Na + K	2.1		

Barr Creek at Mooresville, Iredell County

Date	Mar. 31, 1955	Bicarbonate	34
Color	4	Sulfate	13
pH	6.7	Chloride	2.5
Silica	25	Fluoride	0.0
Iron	0.01	Nitrate	0.0
Calcium	8.2	Dissolved solids	75
Magnesium	2.2	Total hardness	30
Na + K	6.9	Specific conductance	93.8

Broad River near Boiling Springs, Cleveland County

Date	11-10-44	10-1-45 to 9-30-46, incl. (average)	4-27-55
Mean discharge (c.f.s.)	805	1,818	- -
Suspended matter	58	152	- -
Color	5	5	- -
Silica	13	11	- -
Iron	0.07	0.04	- -
Calcium	2.2	2.5	2.6
Magnesium	1.1	1.0	0.8
Na + K	4.5	4.0	- -
Bicarbonate	19	16	14
Sulfate	1.7	2.3	3.5
Chloride	1.5	1.9	1.8
Fluoride	0.1	0.1	- -
Nitrate	0.2	0.5	1.0
Dissolved solids	35	35	34
Total hardness	10	10	10
Temperature	- -	60	- -
Oxygen consumed			
Unfiltered	- -	4.7	- -
Filtered	- -	1.7	- -
Instantaneous discharge (c.f.s.)	- -	- -	1,400
Specific conductance	- -	- -	35.0
pH	- -	- -	6.9

Broad River near Boiling Springs, Cleveland County

Date	10-18-55	3-30-56
Discharge, c.f.s.	679	1,250
Silica	14	12
Iron	0.05	0.06
Calcium	2.8	3.0
Magnesium	1.2	0.6
Na + K	5.3	3.5
Bicarbonate	24	16
Sulfate	1.6	0.3
Chloride	1.5	1.8
Nitrate	0.5	0.6
Fluoride	0.0	0.0
Dissolved solids	39	30
Hardness	12	10
Specific conductance	47.4	38.4
pH	6.8	7.1
Color	11	13

Broad River near Harris, Rutherford County

Date	April 9, 1947	Bicarbonate	16
Color	4	Sulfate	1.4
pH	6.9	Chloride	1.2
Silica	12	Fluoride	0.1
Magnesium	0.9	Nitrate	0.2
Na + K	3.4	Dissolved solids	30
Calcium	2.2	Total hardness	9
Iron	0.05		

Broad River near Chimney Rock, Rutherford County

Date	11-11-44	4-27-55	10-19-55	3-29-56
Discharge, c.f.s.	84	322	169	310
Suspended matter	2	- -	- -	- -
Color	5	- -	6	3
Silica	11	- -	13	12
Iron	0.01	- -	0.00	0.00
Calcium	2.2	2.0	3.2	2.4
Magnesium	0.9	0.5	0.7	0.3
Na + K	4.5	- -	3.5	4.4
Bicarbonate	19	14	18	15
Sulfate	1.7	3.7	2.4	0.9
Chloride	1.5	1.0	2.5	3.0
Fluoride	0.1	- -	0.1	0.1
Nitrate	0.2	0.2	0.4	0.7
Dissolved solids	35	34	35	31
Total hardness	10	7	11	7
Specific conductance	- -	29.1	37.7	31.0
pH	- -	7.0	6.6	6.6

Brushy Creek near Shelby, Cleveland County

Date	Oct. 23, 1958	Sulfate	2.0
Discharge (c.f.s.)	11.1	Chloride	2.4
Silica	12	Fluoride	0.1
Iron	0.03	Nitrate	0.5
Calcium	2.6	Dissolved solids	33
Magnesium	1.1	Total hardness	11
Na + K	3.4	Specific conductance	39.8
Bicarbonate	15	pH	6.7
Color	13		

Buffalo Creek near Waco, Cleveland County

Date	12-20-49	4-27-50	8-15-50	4-26-51	8-9-51	10-9-51	9-10-52
Mean discharge c.f.s.	40.0	35.7	18.5	37.2	22.9	10.9	24.2
Color	5	- -	- -	- -	- -	- -	- -
pH	6.2	6.7	6.8	6.9	6.7	7.0	7.0
Specific conductance	40.9	52.6	58.1	45.3	46.0	52.7	47.0
Silica	11	- -	- -	- -	- -	- -	- -
Iron	0.03	- -	- -	- -	- -	- -	- -
Calcium	2.3	- -	- -	- -	- -	- -	- -
Magnesium	1.2	- -	- -	- -	- -	- -	- -
Na + K	3.8	- -	- -	- -	- -	- -	- -
Bicarbonate	15	23	30	20	19	23	22
Sulfate	2.8	3	2	2	5	2	2
Chloride	2.2	2.2	2.0	3.0	2.5	2.0	2.0
Fluoride	0.1	- -	- -	- -	- -	- -	- -
Nitrate	0.6	- -	- -	- -	- -	- -	- -
Dissolved solids	33	- -	- -	- -	- -	- -	- -
Total hardness	11	16	13	13	14	22	16

Buffalo Creek near Waco (cont'd.)

Date	12-17-52	4-10-53	7-22-53	10-5-53	8-5-54	9-21-55	12-21-55
Discharge c.f.s.	24.0	43.2	17.3	18.2	4.59	3.79	13.7
Calcium	- -	- -	- -	- -	- -	3.6	3.6
Magnesium	- -	- -	- -	- -	- -	1.2	0.6
Bicarbonate	19	27	23	20	20	24	19
Sulfate	1	2	5	2	2	1.3	1.5
Chloride	1.8	3.0	4.0	2.5	3.5	2.0	1.5
Nitrate	- -	- -	- -	- -	- -	- -	0.8
Total hardness	17	15	19	14	12	14	11
Specific conductance	43.2	56.9	62.7	45.9	50.2	47.7	43.2
pH	6.9	6.3	7.2	6.7	6.5	7.0	6.6

Canoe Creek near Morganton, Burke County

Date	Mar. 9, 1948	Bicarbonate	18
Color	6	Sulfate	2.4
pH	7.1	Chloride	1.1
Silica	12	Fluoride	0.0
Iron	0.01	Nitrate	0.1
Calcium	2.6	Dissolved solids	35
Magnesium	1.0	Total hardness	11
Na plus K	3.8		

Catawba River near Belmont, Gaston County

Date	Oct. 20, 1945	Mar. 10, 1948
Suspended matter	8	- -
Color	8	3
Silica	7.9	11
Iron	0.02	0.04
Calcium	3.0	3.6
Magnesium	1.1	1.2
Na + K	3.5	4.3
Bicarbonate	16	19
Sulfate	3.7	4.2
Chloride	1.6	2.0
Fluoride	0.0	0.1
Nitrate	0.6	0.4
Dissolved solids	32	37
Total hardness	12	14
pH	- -	7.0

Catawba River at Catawba, Catawba County

Date	Oct. 1,1945 to Sept. 30, 1946,incl. (average)	Mar.9,1948	Oct.1,1954 to Sept.30,1955,incl. (average)	5-23-56
Mean discharge c.f.s.	2,574	4,290	1,205	2,740
Temperature	58	- -	- -	- -
Suspended matter	14	- -	- -	- -
Oxygen consumed				
Unfiltered	2.7	- -	3.4	- -
Filtered	2.0	- -	2.5	
Color	6	3	7	15

Catawba River at Catawba (cont'd.)

Silica	7.7	8.7	8.4	7.6
Iron	0.04	0.02	0.01	0.01
Calcium	2.9	2.4	3.1	3.0
Magnesium	1.1	1.0	1.1	1.1
Na + K	3.0	2.0	6.1	5.7
Bicarbonate	15	13	18	17
Sulfate	2.6	0.6	3.5	2.1
Chloride	1.8	2.0	4.3	4.5
Fluoride	0.1	0.0	0.1	0.0
Nitrate	0.6	0.6	0.7	1.0
Dissolved solids	30	28	39	33
Total hardness	12	10	12	12
pH	- -	6.9	- -	7.0
Specific conductance	- -	- -	53.0	54.3

Catawba River at Charlotte, Mecklenburg County

Date	3-2-50	6-10-53
Silica	12	9.2
Iron	0.03	0.08
Magnesium	1.2	1.4
Calcium	3.6	3.7
Na + K	3.6	4.3
Bicarbonate	19	20
Sulfate	2.7	2.8
Chloride	2.2	2.9
Fluoride	0.1	0.2
Nitrate	0.2	0.4
Dissolved solids	35	35
Total hardness	14	15
Specific conductance	40.5	44.6
pH	7.2	7.0
Color	13	7

Catawba River near Cramerton, Gaston County

Date	Mar. 10, 1948	Bicarbonate	70
Color	8	Sulfate	9.7
pH	6.8	Chloride	9.1
Silica	17	Fluoride	0.3
Iron	0.02	Nitrate	1.9
Calcium	6.7	Dissolved solids	112
Magnesium	1.9	Total hardness	24
Na + K	27		

Catawba River near Marion, McDowell County

Date	11-13-44	10-1-45 9-30-46, inclusive (average)	3-8-48	9-21-48	5-7-49	6-6-49	9-23-49	4-27-55
Mean discharge c.f.s.	145	367	519	267	475	291	345	231
Suspended matter	2	26	- -	- -	- -	- -	- -	- -
Color	7	6	7	6	4	3	7	- -
Silica	12	9.8	8.6	11	11	11	11	- -

Catawba River near Marion (cont'd.)

Iron	0.03	0.05	0.02	0.03	0.02	0.01	0.02	- -
Calcium	2.4	2.5	1.8	3.8	2.4	2.2	2.2	2.6
Magnesium	1.0	0.9	0.6	1.1	0.8	0.8	0.8	0.3
Na + K	3.7	3.0	2.9	2.6	3.6	2.9	5.3	- -
Bicarbonate	17	14	10	15	14	13	14	17
Sulfate	1.9	2.5	3.0	3.2	2.3	2.6	2.5	5.6
Chloride	1.2	1.2	1.2	2.4	2.2	1.0	4.1	8.0
Fluoride	0.1	0.1	0.0	0.2	0.0	0.1	0.1	- -
Nitrate	0.2	0.3	0.2	0.2	0.2	0.1	0.4	1.0
Dissolved solids	31	30	25	34	30	28	34	52
Total hardness	10	10	7	14	9	9	9	8
pH	- -	- -	7.3	6.9	6.9	6.8	7.4	7.0
Specific conductance	- -	- -	- -	- -	34.1	28.0	41.4	65.7

Catawba River near Marion (cont'd.)

Date	10-20-55	3-28-56
Discharge, c.f.s.	91.2	260
Silica	13	11
Iron	0.06	0.02
Calcium	3.0	2.6
Magnesium	1.0	0.2
Na + K	16.1	10.1
Bicarbonate	23	14
Sulfate	4.6	2.2
Chloride	14	10
Fluoride	0.1	0.1
Nitrate	1.2	1.3
Dissolved solids	64	45
Hardness	12	7
Specific conductance	102	59.3
pH	7.1	6.4
Color	9	- -

Catawba River at Morganton, Burke County

Date	April 12, 1946	Bicarbonate	16
Suspended matter	9	Sulfate	2.5
Color	4	Chloride	1.2
Silica	7.8	Fluoride	0.0
Iron	0.01	Nitrate	0.3
Calcium	2.6	Dissolved solids	27
Magnesium	1.0	Total hardness	11
Na + K	3.2		

Catawba River at Rhodhiss, Caldwell County

Date	Sept. 14, 1945	Bicarbonate	20
Color	11	Sulfate	2.6
Silica	9.0	Chloride	2.6
Iron	0.01	Fluoride	0.0
Calcium	3.3	Nitrate	0.1
Magnesium	1.2	Dissolved solids	35
Na + K	4.4	Total hardness	13

Catawba River at Old Fort, McDowell County

Date	3-8-48	8-3-49	4-13-50	8-27-51	9-20-51	7-15-53
Color	7	5	- -	- -	- -	- -
pH	7.4	6.3	6.6	6.8	7.5	8.7
Silica	11	14	- -	- -	- -	- -
Iron	0.1	0.01	- -	- -	- -	- -
Calcium	2.1	3.2	- -	- -	- -	- -
Magnesium	0.7	0.9	- -	- -	- -	- -
Na + K	2.7	4.0	- -	- -	- -	- -
Bicarbonate	12	20	17	26	22	25
Sulfate	2.4	2.0	2	3	2	3
Chloride	1.0	1.0	1.0	1.0	1.0	1.8
Fluoride	0.1	0.1	- -	- -	- -	- -
Nitrate	0.1	0.3	- -	- -	- -	- -
Dissolved solids	29	36	- -	- -	- -	- -
Total hardness	8	12	11	13	13	14
Mean discharge, c.f.s.	- -	32.5	25.8	6.92	5.70	5.75
Specific conductance	- -	32.7	32.0	47.1	44.3	49.9

Catawba River at Old Fort (cont'd.)

Date	11-4-53	12-2-53	2-3-54	6-14-54	8-5-54	9-7-54	7-31-56
Instantaneous discharge c.f.s.	4.03	5.25	11.8	10.1	4.97	2.57	5.1
Calcium	- -	- -	- -	- -	4.8	4.4	3.3
Magnesium	- -	- -	- -	- -	1.7	1.0	0.8
Bicarbonate	24	23	10	22	24	23	27
Sulfate	3	3	2	4	3	4	1.1
Chloride	1.0	2.8	1.0	1.5	3.5	1.8	1.0
Nitrate	- -	- -	- -	- -	0.1	0.9	0.4
Hardness	17	18	10	16	19	15	16
Specific conductance	45.8	58.3	36.1	40.6	60.6	49.5	55.1
pH	6.7	6.7	6.8	7.0	7.0	6.6	6.6

Clark Creek at Lincolnton, Lincoln County

Date	8-10-49	4-27-50	8-15-50	12-20-50	4-26-51	7-12-51	10-9-51
Mean discharge, c.f.s.	42.1	68.6	27.7	53.3	61.6	22.8	19.7
Color	3	- -	- -	- -	- -	- -	- -
pH	6.9	6.6	6.9	6.5	6.8	6.6	6.8
Specific conductance	132	102	217	126	123	275	252
Silica	18	- -	- -	- -	- -	- -	- -
Iron	0.25	- -	- -	- -	- -	- -	- -
Calcium	5.1	- -	- -	- -	- -	- -	- -
Magnesium	2.3	- -	- -	- -	- -	- -	- -
Na + K	18	- -	- -	- -	- -	- -	- -
Bicarbonate	32	32	42	36	31	43	44
Sulfate	4.8	3	3	4	3	6	4
Chloride	20	11	40	18	16	54	46
Fluoride	0.1	- -	- -	- -	- -	- -	- -
Nitrate	1.0	- -	- -	- -	- -	- -	- -
Dissolved solids	85	- -	- -	- -	- -	- -	- -
Total hardness	22	21	27	22	20	30	33

Clark Creek at Lincolnton, (cont'd.)

Date	5-6-52	10-20-52	4-10-53	7-22-53	11-29-53	3-12-54	9-21-55	8-27-56
Discharge c.f.s.	69.2	36.8	75.8	30.7	30.0	74.6	10.8	17.4
Bicarbonate	40	37	28	50	32	31	45	46
Sulfate	1	4	4	3	3	5	7.4	4.3
Chloride	8.8	6.8	9.8	37	7.2	10	73	18
Total hardness	24	24	26	28	22	19	32	24
Specific conductance	108	93	102	215	95.6	94.4	36.3	166
pH	6.6	6.8	6.5	6.9	6.8	6.8	6.5	6.7
Calcium	- -	- -	- -	- -	- -	- -	8.4	6.4
Magnesium	- -	- -	- -	- -	- -	- -	2.7	1.9
Na + K	- -	- -	- -	- -	- -	- -	- -	25.1
Nitrate	- -	- -	- -	- -	- -	- -	- -	4.4

Cove Creek near Lake Lure, Rutherford

Date	6-26-50	11-8-50	1-3-51	7-12-51	8-28-51	9-21-51	11-5-52	2-4-53
Discharge c.f.s.	82.4	82.9	86.2	56.6	47.2	41.6	43.9	70.1
Color	4	- -	- -	- -	- -	- -	- -	- -
pH	7.0	6.5	6.5	6.7	7.1	7.5	6.7	6.7
Specific conductance	36.0	33.9	33.2	166	37.8	38.0	37.5	35.0
Silica	16	- -	- -	- -	- -	- -	- -	- -
Iron	0.09	- -	- -	- -	- -	- -	- -	- -
Calcium	2.8	- -	- -	- -	- -	- -	- -	- -
Magnesium	0.6	- -	- -	- -	- -	- -	- -	- -
Na + K	3.7	- -	- -	- -	- -	- -	- -	- -
Bicarbonate	15	21	17	20	21	19	22	18
Sulfate	2.2	1	1	2	1	2	1	1
Chloride	1.8	1.2	1.0	1.5	1.2	1.0	1.2	1.0
Fluoride	0.1	- -	- -	- -	- -	- -	- -	- -
Nitrate	0.1	- -	- -	- -	- -	- -	- -	
Dissolved solids	35	- -	- -	- -	- -	- -	- -	- -
Total hardness	9	10	9	11	11	13	12	- -

Cove Creek near Lake Lure, (cont'd.)

Date	5-5-53	6-3-53	2-3-54	8-6-54	9-8-54	4-26-55	10-19-55	3-29-56
Iron	- -	- -	- -	- -	- -	- -	0.09	0.04
Disch.c.f.s.	197	50.1	80.1	28.4	21.2	81	42.2	75.5
Bicarbonate	13	18	13	21	19	16	20	17
Sulfate	6	1	2	2	2	3.3	1.8	1.2
Chloride	1.0	1.5	1.5	2.8	1.5	1.5	1.0	2.5
Color	- -	- -	- -	- -	- -	- -	11	- -
Tot.hardness	11	10	8	16	10	9	11	8
Specific conductance	33.0	35.9	32.5	43.4	39.2	34.1	36.7	36.4
pH	6.1	6.5	6.9	6.7	6.6	7.3	7.0	6.6
Calcium	- -	- -	- -	3.2	2.8	2.2	2.4	2.4
Magnesium	- -	- -	- -	1.9	0.7	0.9	1.2	0.5
Nitrate	- -	- -	- -	0.2	0.5	0.6	0.1	0.6
Dissolved solids	- -	- -	- -	- -	- -	50	37	35
Silica	- -	- -	- -	- -	- -	- -	17	15
Na + K	- -	- -	- -	- -	- -	- -		

Crowders Creek near Gastonia, Gaston County

Date	8-10-49	4-27-50	8-15-50	4-26-51	8-29-51	11-19-51	4-17-52	9-12-52
Mean disch. c.f.s.	47.8	60.8	31.3	73.4	13.3	24.3	69.2	38.0
Color	6	- -	- -	- -	- -	- -	- -	- -
pH	6.5	6.7	7.0	6.6	6.6	6.9	6.6	6.7
Specific conductance	76.5	77.5	99.7	85.6	116	93.7	80.9	149
Silica	20	- -	- -	- -	- -	- -	- -	- -
Iron	0.19	- -	- -	- -	- -	- -	- -	- -
Calcium	6.1	- -	- -	- -	- -	- -	- -	- -
Magnesium	2.0	- -	- -	- -	- -	- -	- -	- -
Na + K	6.7	- -	- -	- -	- -	- -	- -	- -
Bicarbonate	33	34	37	36	37	38	33	54
Sulfate	4.1	3	6	6	13	4	2	10
Fluoride	4.2	4.2	7.5	4.8	8.0	5.5	4.0	- -
Chloride	0.2	- -	- -	- -	- -	- -	- -	10
Nitrate	0.4	- -	- -	- -	- -	- -	- -	- -
Dissolved solids	63	- -	- -	- -	- -	- -	- -	- -
Total hardness	23	21	23	23	27	27	22	31

Crowders Creek near Gastonia, Gaston County

Date	12-18-52	4-10-53	7-22-53	10-5-53	3-12-54	9-21-55	12-21-55	8-30-56
Disch.c.f.s.	31.7	66.6	29.2	18.2	58.8	5.43	- -	22
Bicarbonate	42	31	60	40	50	189	162	80
Sulfate	8	5	21	5	5	383	53	140
Chloride	8.8	7.8	14	5.2	6.8	48	2.2	18
Total hardness	26	23	26	25	23	184	32	108
Specific conductance	124	114	174	105	123	1290	512	547
pH	6.8	6.5	7.1	6.7	7.0	8.0	9.4	6.8
Calcium	- -	- -	- -	- -	- -	58	12	37
Magnesium	- -	- -	- -	- -	- -	9.3	0.8	3.9
Na + K	- -	- -	- -	- -	- -	- -	- -	67
Nitrate	- -	- -	- -	- -	- -	- -	0.7	1.1

Curtis Creek near Old Fort, McDowell County

Date	8-3-49	4-13-50	9-19-50	7-12-51	8-27-51	9-20-51	11-4-52	2-3-53
Disch.c.f.s.	68.2	35.3	46.3	10.0	6.53	5.01	7.07	25.1
Color	7	--	- -	- -	- -	- -	- -	- -
pH	7.1	6.3	6.8	6.8	6.7	7.0	7.0	5.8
Specific conductance	18.5	18.4	22.2	24.2	28.8	27.4	33.7	24.8
Silica	7.9	- -	- -	- -	- -	- -	- -	- -
Iron	0.02	- -	- -	- -	- -	- -	- -	- -
Calcium	1.5	- -	- -	- -	- -	- -	- -	- -
Magnesium	0.5	- -	- -	- -	- -	- -	- -	- -
Na + K	2.7	- -	- -	- -	- -	- -	- -	- -
Bicarbonate	8	8	10	12	12	11	16	8
Sulfate	2.9	3	2	2	2	1	3	5
Chloride	1.0	0.5	1.0	0.8	1.2	1.0	0.8	1.2
Fluoride	0.2	- -	- -	- -	- -	- -	- -	- -
Nitrate	0.2	- -	- -	- -	- -	- -	- -	- -
Dis. solids	20	- -	- -	- -	- -	- -	- -	- -
Tot. hardness	6	6	6	5	9	10	14	7

Curtis Creek near Old Fort (cont'd.)

Date	5-4-53	6-2-53	8-10-53	12-2-53	2-3-54	6-14-54	8-5-54	9-7-54
Disch. c.f.s.	19.8	10.6	6.21	6.27	25.5	12.9	5.57	3.18
Bicarbonate	10	21	11	9	8	14	8	8
Sulfate	2	2	2	1	2	2	1	3
Chloride	0.8	1.2	0.5	1.0	2.0	1.0	0.8	0.8
Tot. hardness	11	7	6	6	8	7	6	6
Specific conductance	23.3	25.3	25.2	28.8	27.3	28.6	29.0	24.7
pH	6.3	6.5	6.6	6.4	7.0	7.0	6.2	6.3
Calcium	- -	- -	- -	- -	- -	- -	1.6	1.6
Magnesium	- -	- -	- -	- -	- -	- -	0.5	0.5
Nitrate	- -	- -	- -	- -	- -	- -	0.4	1.0

Curtis Creek near Old Fort (cont'd.)

Date	5-16-56	6-12-56	7-31-56
Discharge, c.f.s.	23.5	11.6	31.0
Calcium	1.4	1.4	2.0
Magnesium	0.5	0.6	0.4
Bicarbonate	8	10	12
Sulfate	2.2	1.0	1.5
Chloride	0.3	1.1	1.0
Nitrate	0.4	0.0	1.2
Hardness	6	6	7
Specific conductance	20.8	20.6	33.4
pH	6.4	6.6	6.4

Davidsons Creek near Cornelius, Mecklenburg County

Date	3-9-48	8-23-49	3-6-50	9-20-50	3-8-51	7-12-51	10-10-51	5-14-52
Color	4	8	- -	- -	- -	- -	- -	7.0
pH	7.0	7.2	7.3	7.1	7.2	6.9	7.3	6.8
Silica	17	26	- -	- -	- -	- -	- -	- -
Iron	0.05	0.10	- -	- -	- -	- -	- -	- -
Calcium	5.2	8.4	- -	- -	- -	- -	- -	- -
Magnesium	1.9	4.3	- -	- -	- -	- -	- -	- -
Na + K	4.5	4.0	- -	- -	- -	- -	- -	- -
Bicarbonate	28	50	44	45	47	42	48	49
Sulfate	3.7	2.2	6	4	4	3	3	2
Chloride	2.2	2.6	3.0	2.8	2.5	2.2	2.8	2.5
Fluoride	0.2	0.1	- -	- -	- -	- -	- -	- -
Nitrate	0.2	0.2	- -	- -	- -	- -	- -	- -
Dissolved solids	52	76	- -	- -	- -	- -	- -	- -
Total hardness	21	39	32	30	35	27	35	36
Disch. c.f.s.	- -	12.5	20.6	11.1	17.0	5.95	2.52	13.6
Specific conductance	- -	92.2	93.0	88.6	96.5	84.8	93.5	97.5

Davidsons Creek near Cornelius, (cont'd.)

Date	10-2-52	4-9-53	7-17-53	9-3-53	3-12-54	8-7-54	10-4-54	9-21-55
Disch. c.f.s.	6.97	25.3	6.02	3.30	23.0	6.03	1.27	2.19
Bicarbonate	47	42	48	49	39	53	48	54
Sulfate	4	5	5	3	4	5	1	4.1
Chloride	2.8	3.5	3.5	3.0	1.0	3.8	3.2	2.0
Hardness	33	31	33	32	28	33	32	35
Specific conductance	91.4	86.7	97.0	94.9	83.4	96.4	96.8	101

Davidsons Creek near Cornelius (cont'd.)

	10-2-52	4-9-53	7-17-53	9-3-53	3-12-54	8-7-54	10-4-54	9-21-59
pH	6.9	6.9	7.1	7.2	7.0	7.4	7.0	7.1
Calcium	- -	- -	- -	- -	- -	- -	8.5	9.5
Magnesium	- -	- -	- -	- -	- -	- -	2.6	2.7
Nitrate	- -	- -	- -	- -	- -	- -	1.0	- -

Davidsons Creek near Cornelius (cont'd.)

Date	12-20-55	6-15-56	8-27-56
Discharge, c.f.s.	9.81	5.97	2.75
Calcium	9.8	10	9.6
Magnesium	1.8	2.8	1.5
Bicarbonate	56	54	49
Sulfate	4.5	3.0	2.1
Chloride	2.4	2.0	1.5
Nitrate	0.5	0.5	0.4
Hardness	37	30	18
Specific conductance	101	96.9	66.7
pH	7.1	7.2	6.8
Na + K	- -	- -	7.3

Dehart Creek at Cramerton, Gaston County

Date	April 16, 1954	Chloride	3.2
Silica	11	Fluoride	0.0
Iron	0.06	Nitrate	1.4
Calcium	10	Dissolved solids	69
Magnesium	2.5	Hardness	35
Na + K	3.3	Specific conductance	91.6
Bicarbonate	34	pH	6.6
Sulfate	8.6	Color	19

Drowning Creek near Rhodhiss, Burke County

Date	Mar. 9, 1958	Bicarbonate	8
Color	7	Sulfate	2.8
pH	6.9	Chloride	1.5
Silica	7.2	Fluoride	0.1
Iron	0.02	Nitrate	0.6
Calcium	1.4	Dissolved solids	23
Magnesium	0.8	Total hardness	7
Na + K	2.6		

Dutchmans Creek at Mount Holly, Gaston County

Date	3-10-48	Na + K	4.3
Color	2	Bicarbonate	24
pH	7.0	Sulfate	3.5
Silica	15	Chloride	1.8
Iron	0.02	Nitrate	0.2
Calcium	3.9	Dissolved solids	42
Magnesium	1.7	Total hardness	17

Dutchmans Creek near Stanley, Gaston County

Date	9-23-49	3-6-50	11-30-50	5-8-51	7-12-51	10-10-51	5-14-52
Color	7	- -	- -	- -	- -	- -	- -
pH	7.2	7.1	6.8	6.9	7.1	6.9	7.0
Silica	20	- -	- -	- -	- -	- -	- -
Iron	0.02	- -	- -	- -	- -	- -	- -
Calcium	5.2	- -	- -	- -	- -	- -	- -
Magnesium	2.1	- -	- -	- -	- -	- -	- -
Na + K	5.2	- -	- -	- -	- -	- -	- -
Bicarbonate	33	35	36	41	40	37	96
Sulfate	2.5	7	2	3	2	2	1
Chloride	2.0	2.2	2.0	2.0	2.2	2.0	2.0
Fluoride	0.1	- -	- -	- -	- -	- -	- -
Nitrate	0.1	- -	- -	- -	- -	- -	- -
Dissolved Solids	53	- -	- -	- -	- -	- -	- -
Total hardness	22	23	22	25	24	26	25
Discharge, c.f.s.	50.0	74.8	36.9	59.9	11.9	13.6	59.5
Specific conductance	64.7	74.0	69.4	76.6	72.3	74.7	70.2

Dutchmans Creek near Stanley (cont'd.)

Date	10-1-52	4-9-53	7-17-53	9-3-53	3-12-54	8-7-54	10-4-54
Discharge, c.f.s.	33.1	84.6	27.3	27.3	76.4	6.03	3.52
Bicarbonate	35	34	34	32	32	53	30
Sulfate	1	3	3	2	3	5	1
Chloride	1.5	2.5	2.0	1.8	2.0	3.8	1.8
Total hardness	24	22	22	19	21	33	18
Specific conductance	66.9	84.1	66.3	63.4	63.5	96.4	58.3
pH	7.0	6.8	6.7	7.0	7.3	7.4	7.6
Calcium	- -	- -	- -	- -	- -	- -	4.4
Magnesium	- -	- -	- -	- -	- -	- -	1.7
Nitrate	- -	- -	- -	- -	- -	- -	0.1

Dutchmans Creek near Stanley (cont'd.)

Date	9-21-55	12-20-55	6-15-56	8-29-56
Color	- -	- -	- -	- -
pH	7.5	6.8	6.8	7.0
Silica	- -	- -	- -	- -
Iron	- -	- -	- -	- -
Calcium	6.1	5.6	5.8	6.7
Magnesium	1.7	1.0	1.8	0.5
Na + K	- -	- -	- -	5.7
Bicarbonate	35	34	33	36
Sulfate	3.4	2.1	2.7	2.4
Chloride	2.0	1.5	2.0	2.0
Fluoride	- -	- -	- -	- -
Nitrate	- -	0.4	0.9	0.5
Dissolved solids	22	- -	- -	- -
Total hardness	- -	18	22	19
Discharge, c.f.s.	7.78	33.0	54.8	15.6
Specific conductance	67.8	66.7	67.0	71.3

Elk Shoals Creek near Paynes Store, Alexander County

Date	3-9-48	Bicarbonate	19
Color	2	Sulfate	1.8
pH	6.9	Chloride	1.5
Silica	13	Fluoride	0.1
Iron	0.04	Nitrate	0.2
Calcium	2.8	Dissolved solids	35
Magnesium	1.4	Total hardness	13
Na + K	3.3		

First Broad River near Casar, Cleveland County

Date	3-2-50	9-20-50	1-5-51	5-2-51	8-9-51	10-9-51	5-15-52
Discharge, c.f.s.	79.8	43.7	42.7	79.6	26.6	21.2	67.8
Color	4	- -	- -	- -	- -	- -	- -
pH	6.3	7.1	6.7	7.3	6.8	6.9	6.5
Specific conductance	36.6	45.9	34.8	38.2	48.1	50.5	36.2
Silica	14	- -	- -	- -	- -	- -	- -
Iron	0.03	- -	- -	- -	- -	- -	- -
Calcium	2.7	- -	- -	- -	- -	- -	- -
Magnesium	1.2	- -	- -	- -	- -	- -	- -
Na + K	3.2	- -	- -	- -	- -	- -	- -
Bicarbonate	18	20	18	18	25	23	48
Sulfate	2.0	2	2	1	2	2	1
Chloride	1.2	1.2	1.8	1.5	2.0	1.5	1.5
Nitrate	0.1	- -	- -	- -	- -	- -	- -
Dissolved solids	35	- -	- -	- -	- -	- -	- -
Total hardness	12	13	12	10	14	23	10

First Broad River near Casar (cont'd.)

Date	11-17-52	5-5-53	7-14-53	11-21-53	8-5-54	10-5-54	9-21-55	8-7-56
Discharge, c.f.s.	35.5	58.2	21.2	31.1	19.1	15.2	14.5	- -
Bicarbonate	19	20	19	18	19	19	22	16
Sulfate	2	4	1	2	2	1	1.3	1.8
Chloride	1.8	1.8	4.2	1.5	2.0	1.5	1.0	1.0
Total hardness	14	13	13	10	10	12	15	6
Specific conductance	38.1	42.2	40.0	35.7	40.8	37.6	41.7	41.1
pH	6.7	6.1	6.8	6.9	7.0	6.7	7.0	6.6
Calcium	- -	- -	- -	- -	- -	2.3	3.3	1.9
Magnesium	- -	- -	- -	- -	- -	1.5	1.6	0.3
Nitrate	- -	- -	- -	- -	- -	1.0	- -	0.8
Na + K	- -	- -	- -	- -	- -	- -	- -	3.2

First Broad River near Lawndale, Cleveland County

Date	11-10-44	4-26-55	10-18-55	3-30-56
Discharge, c.f.s.	154	162	69.8	149
Suspended matter	5	- -	- -	- -
Color	3	- -	- -	- -
Silica	12	- -	14	11
Iron	0.01	- -	0.15	0.13
Calcium	2.4	2.7	3.6	2.8
Magnesium	1.2	0.9	0.7	0.3
Na + K	11.2	- -	5.3	10.3
Bicarbonate	30	22	21	23
Sulfate	3.4	5.6	3.1	2.4
Chloride	3.6	3.5	1.5	5.5

First Broad River near Lawndale (cont'd.)

	11-10-44	4-26-55	10-18-55	3-30-56
Fluoride	0.1	- -	0.1	0.1
Nitrate	0.3	- -	0.4	0.9
Dissolved solids	46	- -	39	41
Total hardness	11	14	12	8
Specific conductance	- -	47.7	45.4	60.6
pH	- -	7.0	6.8	6.8

Floyds Creek near Cliffside, Rutherford County

Date	11-5-54	9-22-55	6-15-56
Discharge, c.f.s.	5.95	6.84	3.22
Calcium	2.2	2.7	1.6
Magnesium	0.9	0.8	0.2
Bicarbonate	18	20	11
Sulfate	1	1.5	0.9
Chloride	3.0	2.5	4.0
Nitrate	1.6	- -	0.3
Hardness	9	10	5
Specific conductance	45.5	48.6	33.2
pH	7.0	6.8	7.0

Floyds Creek at Harris, Rutherford County

Date	4-9-47	Bicarbonate	14
Color	17	Sulfate	3.4
pH	6.5	Chloride	8.6
Silica	8.3	Fluoride	0.1
Iron	0.29	Nitrate	0.5
Calcium	2.4	Dissolved solids	44
Magnesium	1.0	Total hardness	10
Na + K	8.1		

Green River near Mill Spring, Rutherford County

Date	11-11-44	Bicarbonate	16
Discharge, c.f.s.	297	Sulfate	1.3
Suspended matter	69	Chloride	1.2
Color	6	Fluoride	0.1
Silica	10	Nitrate	0.3
Iron	0.01	Dissolved solids	28
Calcium	1.9	Total hardness	9
Magnesium	1.0	Na + K	3.6

Henry Fork near Henry River, Burke County

Date	8-6-46	3-9-48	4-20-55	10-12-55	3-21-56
Discharge, c.f.s.	95	256	89.0	56.0	82
Suspended matter	89	- -	- -	- -	- -
Color	6	9	- -	27	10
pH	- -	6.8	6.8	7.2	6.5
Silica	8.7	6.1	- -	10	8.7
Iron	0.04	0.01	- -	0.02	0.03
Calcium	1.5	1.0	1.8	2.0	2.6
Magnesium	0.8	0.6	1.0	1.2	0.3
Na + K	3.4	3.1	- -	2.7	2.4
Bicarbonate	12	6	8	12	9

Henry Fork near Henry River, (cont'd.)

	8-6-46	3-9-48	4-20-55	10-12-55	3-21-56
Sulfate	2.5	2.7	5.6	3.1	4.2
Chloride	1.1	2.5	1.2	1.0	2.0
Fluoride	0.1	0.1	- -	0.1	0.1
Nitrate	0.4	0.2	0.5	1.7	0.3
Dissolved solids	25	20	28	28	25
Total hardness	7	5	9	10	8
Specific conductance	- -	- -	27.4	29.4	29.4

Henry Fork (impounded) near Morganton, Burke County

Date	4-29-46	Bicarbonate	7.0
Color	1	Sulfate	2.3
pH	1	Chloride	1.0
Silica	6.5	Nitrate	0.1
Iron	0.07	Dissolved solids	19
Calcium	1.3	Total hardness	6
Magnesium	0.7	Na + K	1.7

Hoyles Creek near Stanley, Gaston County

Date	Nov. 26, 1952	Chloride	2.6
Discharge, c.f.s.	- -	Fluoride	0.2
Silica	22	Nitrate	0.1
Iron	0.18	Dissolved solids	62
Calcium	6.9	Total hardness	24
Magnesium	1.6	Specific conductance	58.6
Na + K	5.8	pH	7.6
Bicarbonate	30	Color	24
Sulfate	7.2		

Indian Creek at Crouse, Lincoln County

	8-10-49	2-21-50	4-27-50	6-26-50	8-15-50
Date					
Discharge, c.f.s.	39.0	57.3	54.5	38.9	27.7
Color	8	- -	- -	- -	- -
pH	6.4	6.2	6.7	6.6	6.7
Specific conductance	43.0	42.7	51.3	49.7	44.5
Silica	13	- -	- -	- -	- -
Iron	0.04	- -	- -	- -	- -
Calcium	3.2	- -	- -	- -	- -
Magnesium	1.3	- -	- -	- -	- -
Na + K	3.7	- -	- -	- -	- -
Bicarbonate	19	19	22	23	19
Sulfate	2.1	1	2	1	2
Chloride	2.1	2.2	1.8	2.0	2.0
Fluoride	0.1	- -	- -	- -	- -
Nitrate	0.5	- -	- -	- -	- -
Dissolved solids	36	- -	- -	- -	- -
Total hardness	13	13	14	20	13

Indian Creek near Laboratory, Lincoln County

	4-26-55	10-11-55	3-21-56
Date			
Discharge, c.f.s.	50.2	29.4	70
Calcium	4.1	4.2	4.0
Magnesium	1.8	2.0	1.4
Bicarbonate	22	28	20
Sulfate	4.3	1.3	2.8

Indian Creek near Laboratory, (cont'd.)

	4-26-55	10-11-55	3-21-56
Chloride	3.0	2.0	2.5
Nitrate	1.0	0.8	1.4
Dissolved solids	50	45	40
Hardness	18	19	16
Specific conductance	54.1	56.7	50.1
pH	6.9	6.8	6.8
Silica	- -	15	14
Iron	- -	0.27	0.0
Na + K	- -	4.9	3.8
Fluoride	- -	0.2	0.0
Color	- -	32	3

Jacob Fork near Startown, Catawba County

Date	11-18-49	8-15-50	11-30-50	7-12-51	10-9-51	5-6-52	11-18-52
Discharge, c.f.s.	121	7.1	54.2	46.2	38.4	129	58.4
Color	5	- -	- -	- -	- -	- -	- -
pH	6.7	6.7	6.5	6.6	6.4	6.5	7.4
Specific conductance	40.5	31.4	30.0	38.7	38.8	28.1	29.5
Silica	9.5	- -	- -	- -	- -	- -	- -
Iron	0.02	- -	- -	- -	- -	- -	- -
Calcium	2.0	- -	- -	- -	- -	- -	- -
Magnesium	1.1	- -	- -	- -	- -	- -	- -
Na + K	4.0	- -	- -	- -	- -	- -	- -
Bicarbonate	12	14	14	14	17	14	13
Sulfate	2.5	2	1	2	2	1	3
Chloride	3.8	1.2	1.2	1.5	1.5	1.5	1.8
Fluoride	0.1	- -	- -	- -	- -	- -	- -
Nitrate	0.1	- -	- -	- -	- -	- -	- -
Dissolved solids	31	- -	- -	- -	- -	- -	- -
Total hardness	10	8	8	9	17	10	9

Jacob Fork near Startown (cont'd.)

Date	4-10-53	7-20-53	10-6-53	5-27-54	9-20-55	8-7-56	8-27-56
Discharge, c.f.s.	58.4	51.9	68.7	108	24.4	32.5	30.4
Bicarbonate	13	15	15	4	17	15	14
Sulfate	1	2	3	1	1.3	1.3	1.1
Chloride	1.5	1.2	2.0	2.0	0.5	1.0	1.0
Total hardness	9	9	9	7	10	8	6
Specific conductance	27.3	30.9	32.4	26.7	33.2	33.2	31.8
pH	6.7	6.5	6.4	6.5	6.9	6.5	6.5
Calcium	- -	- -	- -	- -	2.7	2.4	1.9
Magnesium	- -	- -	- -	- -	0.8	0.5	0.3
Nitrate	- -	- -	- -	- -	0.5	0.6	0.8
Na + K	- -	- -	- -	- -	- -	- -	2.5

Johns River near Chesterfield, Burke County

Date	Mar. 9, 1948	Bicarbonate	11
Color	13	Sulfate	2.4
pH	7.0	Chloride	0.8
Silica	8.4	Fluoride	0.1
Iron	0.01	Nitrate	0.1
Calcium	1.2	Dissolved solids	24
Magnesium	0.6	Total hardness	5
Na + K	3.5		

Johns River at Collettsville, Caldwell County

Date	10-5-49	4-28-50	8-18-50	2-6-51	7-13-51	9-13-51	10-17-51
Discharge, c.f.s.	6	- -	- -	- -	- -	- -	- -
pH	7.0	6.5	6.9	6.8	6.8	6.9	6.6
Specific conductance	26.0	28.1	30.4	27.5	35.2	33.4	32.7
Silica	8.8	- -	- -	- -	- -	- -	- -
Iron	0.02	- -	- -	- -	- -	- -	- -
Calcium	2.6	- -	- -	- -	- -	- -	- -
Magnesium	0.6	- -	- -	- -	- -	- -	- -
Na + K	3.4	- -	- -	- -	- -	- -	- -
Bicarbonate	16	14	17	12	18	17	15
Sulfate	1.6	2	1	1	1	1	1
Chloride	1.0	1.0	1.0	1.0	1.0	1.5	1.2
Nitrate	0.1	- -	- -	- -	- -	- -	- -
Dissolved solids	26	- -	- -	- -	- -	- -	- -
Total hardness	9	7	8	8	9	11	11

Johns River at Collettsville (cont'd.)

Date	7-23-52	11-7-52	4-10-53	7-16-53	10-20-53	5-27-54	8-11-54
Discharge, c.f.s.	27.9	19.9	104	32.7	20.0	74.4	8.84
Bicarbonate	17	16	12	15	15	12	19
Sulfate	1	2	2	2	1	2	1
Chloride	1.0	0.8	1.5	1.2	1.0	1.5	2.2
Total hardness	13	11	7	9	9	7	11
Specific conductance	32.8	31.4	30.6	33.5	32.9	26.4	34.0
pH	7.0	6.8	6.4	6.6	6.6	6.7	7.0

Johns River at Collettsville (cont'd.)

Date	9-22-55	5-22-56	8-23-56	9-21-56
Discharge, c.f.s.	22.8	75.4	16.9	9.81
Bicarbonate	18	16	18	19
Sulfate	2.3	1.1	2.5	1.0
Chloride	0.5	0.3	2.5	1.0
Total hardness	10	8	10	5
Specific conductance	33.8	39.3	36.4	18.4
pH	6.7	6.8	6.7	6.6
Calcium	3.0	3.1	2.8	2.6
Magnesium	0.5	0.3	0.2	0.8
Nitrate		0.7	0.6	0.1

Lake Tahoma near Garden City, McDowell County

Date	4-21-49	Na + K	1.3
Color	2	Bicarbonate	8
pH	6.2	Sulfate	2.4
Specific conductance	20.1	Chloride	0.5
		Fluoride	0.0
Silica	7.4	Nitrate	0.1
Iron	0.01	Dissolved solids	22
Calcium	2.3	Total hardness	7
Magnesium	0.3		

Long Creek near Bessemer City, Gaston County

Date	5-3-55	11-3-55	3-21-56	4-12-56
Discharge, c.f.s.	13.2	7.95	25	77.3
Calcium	6.0	5.0	5.5	4.7
Magnesium	2.2	2.7	1.3	1.5
Bicarbonate	34	34	25	20
Sulfate	4.3	2.8	6.8	3.2
Chloride	2.0	1.5	3.8	2.2
Nitrate	0.5	0.2	0.9	1.1
Dissolved solids	58	46	53	38
Hardness	24	23	19	18
Specific conductance	68.1	66.6	70.7	58.0
pH	7.4	6.9	6.6	6.5
Silica	- -	11	17	11
Iron	- -	0.21	0.03	0.05
Na + K	- -	5.0	5.7	4.3
Fluoride	- -	0.1	0.0	0.2
Color	- -	19	12	32

Long Creek near Gastonia, Gaston County

Date	8-10-49	4-27-50	8-15-50	4-26-51	11-19-51	4-17-52	9-12-52
Discharge,c.f.s.	20.8	26.7	11.5	40.8	11.2	29.0	21.1
Color	3	- -	- -	- -	- -	- -	- -
pH	7.1	6.7	7.0	6.9	7.0	6.6	6.6
Specific conductance	58.2	62.2	62.8	64.4	65.5	58.9	72.1
Silica	17	- -	- -	- -	- -	- -	- -
Iron	0.01	- -	- -	- -	- -	- -	- -
Calcium	5.3	- -	- -	- -	- -	- -	- -
Magnesium	2.1	- -	- -	- -	- -	- -	- -
Na + K	4.0	- -	- -	- -	- -	- -	- -
Bicarbonate	30	32	34	31	35	29	38
Sulfate	2.3	2	2	3	1	2	2
Chloride	2.1	2.0	2.2	1.8	2.2	2.0	2.5
Fluoride	0.1	- -	- -	- -	- -	- -	- -
Nitrate	0.3	- -	- -	- -	- -	- -	- -
Dissolved solids	48	- -	- -	- -	- -	- -	- -
Total hardness	22	22	22	20	24	22	33

Long Creek near Mount Holly, Gaston County

Date	3-10-48	Calcium	6.0	Chloride	2.8
Color	4	Magnesium	2.5	Fluoride	0.2
pH	6.8	Na + K	4.7	Nitrate	0.2
Silica	14	Bicarbonate	31	Dissolved solids	54
Iron	0.02	Sulfate	5.3	Total hardness	25

Long Creek at Spencer Mountain, Gaston County

Date	3-10-48	Calcium	2.8	Chloride	3.1
Color	4	Magnesium	1.7	Fluoride	0.1
pH	6.8	Na + K	6.7	Nitrate	0.6
Silica	14	Bicarbonate	23	Dissolved solids	47
Iron	0.02	Sulfate	4.4	Total hardness	14

Lower Creek at Lenoir, Caldwell County

Date	10-5-49	9-20-50	2-6-51	6-8-51	7-13-51	9-18-51	10-17-51	7-23-52
Discharge, c.f.s.	14.5	12.0	16.6	11.6	9.00	5.89	5.57	5.13
Color	9	- -	- -	- -	- -	- -	- -	- -
pH	7.6	7.1	6.9	6.9	6.8	7.3	6.8	7.1
Specific conductance	52.1	59.6	52.9	57.6	64.1	64.8	66.4	77.3
Silica	19	- -	- -	- -	- -	- -	- -	- -
Iron	0.07	- -	- -	- -	- -	- -	- -	- -
Calcium	4.4	- -	- -	- -	- -	- -	- -	- -
Magnesium	1.8	- -	- -	- -	- -	- -	- -	- -
Na + K	4.5	- -	- -	- -	- -	- -	- -	- -
Bicarbonate	28	33	23	28	32	34	32	41
Sulfate	2.1	2	2	4	3	2	2	1
Chloride	1.8	1.5	2.0	2.8	2.0	1.5	1.8	2.0
Nitrate	0.1	- -	- -	- -	- -	- -	- -	- -
Dissolved solids	48	- -	- -	- -	- -	- -	- -	- -
Total hardness	18	20	18	20	21	21	24	28

Lower Creek at Lenoir, (cont'd.)

Date	11-7-52	4-10-53	7-16-53	9-18-53	3-11-54	7-30-54	9-22-55	5-22-56	8-23-56
Discharge	5.36	12.3	4.89	3.99	11.9	4.29	2.38	4.82	1.03
Bicarbonate	33	29	33	33	24	32	37	32	34
Sulfate	1	4	2	3	5	3	2.5	2.6	2.2
Chloride	2.2	3.2	1.5	2.2	2.0	1.8	1.5	1.2	2.0
Total hardness	22	20	21	20	17	18	23	22	21
Specific conductance	63.3	61.3	63.9	36.0	55.8	62.5	69.6	64.8	69.4
pH	6.7	6.6	6.7	7.2	6.9	7.0	7.0	6.9	6.8
Calcium	- -	- -	- -	- -	- -	- -	4.5	6.1	5.7
Magnesium	- -	- -	- -	- -	- -	- -	1.8	1.6	1.6
Nitrate	- -	- -	- -	- -	- -	- -	- -	0.9	0.8

Lower Little River at Millersville, Alexander County

Date	3-9-48	Bicarbonate	10
Color	3	Sulfate	2.3
pH	6.8	Chloride	1.5
Silica	8.4	Fluoride	0.0
Iron	0.03	Nitrate	0.4
Calcium	1.8	Dissolved solids	24
Magnesium	0.8	Total hardness	8
Na + K	2.4		

Lower Little River near Taylorsville, Alexander County

Date	3-2-47	10-5-49	1-24-40	2-24-50	8-18-50	2-26-51
Color	24	8	- -	- -	- -	- -
pH	7.1	7.4	6.6	7.0	6.7	6.8
Silica	9.1	11	- -	- -	- -	- -
Iron	0.03	0.08	- -	- -	- -	- -
Calcium	2.0	2.3	- -	- -	- -	- -
Magnesium	0.9	0.9	- -	- -	- -	- -
Na + K	2.4	2.9	- -	- -	- -	- -
Bicarbonate	12	14	14	12	14	14
Sulfate	2.3	1.9	1	2	1	2
Chloride	1.1	1.5	3.0	2.0	1.2	1.5
Nitrate	0.1	0.2	- -	- -	- -	- -
Dissolved solids	26	28	- -	- -	- -	- -
Total hardness	9	9	9	8	8	10
Discharge, c.f.s.	69.4	28.4	- -	68.6	38.3	59.7
Specific conductance	- -	- -	- -	- -	- -	30.8

Lower Little River near Taylorsville (cont'd.)

Date	5-29-51	8-13-51	9-27-52	11-24-52	3-19-53
Discharge, c.f.s.	43.8	22.2	27.0	34.7	89.0
pH	7.1	7.0	6.4	7.4	6.5
Specific conductance	29.9	31.0	34.6	31.8	39.5
Bicarbonate	14	14	18	16	14
Sulfate	2	2	2	2	2.0
Chloride	2.5	1.5	1.5	1.8	2.0
Total hardness	9	14	14	12	12

Lyle Creek at Catawba, Catawba County

Date	3-9-48	10-21-49	1-20-50	4-18-50	7-14-40	11-15-50	5-7-51
Color	2	6	- -	- -	- -	- -	- -
pH	7.1	6.6	6.9	6.8	6.9	6.6	6.8
Silica	15	20	- -	- -	- -	- -	- -
Iron	0.03	0.15	- -	- -	- -	- -	- -
Calcium	3.8	5.1	- -	- -	- -	- -	- -
Magnesium	1.7	2.1	- -	- -	- -	- -	- -
Na + K	3.5	4.0	- -	- -	- -	- -	- -
Bicarbonate	22	33	26	32	33	37	35
Sulfate	2.6	2.6	7	1	3	1	2
Chloride	2.0	2.9	2.8	2.0	2.5	2.8	1.5
Fluoride	0.1	0.1	- -	- -	- -	- -	- -
Nitrate	0.4	0.1	- -	- -	- -	- -	- -
Dissolved solids	41	56	- -	- -	- -	- -	- -
Total hardness	16	21	21	29	26	21	23
Discharge, c.f.s.	- -	48.1	75.8	68.6	44.5	37.2	50.1
Specific conductance	- -	65.3	59.9	61.0	68.1	67.8	67.0

Lyle Creek at Catawba (cont'd)

Date	8-6-51	10-9-51	5-5-52	9-3-52	12-18-52	5-27-53	11-10-53
Discharge, c.f.s.	40.7	21.6	67.5	60.6	35.6	46.7	26.6
pH	6.7	6.9	6.9	7.1	6.6	6.1	7.1
Specific conductance	83.7	79.7	69.0	67.3	69.4	82.7	64.3
Bicarbonate	40	37	36	33	34	34	33
Sulfate	5	4	1	5	2	1	2
Chloride	4.2	2.5	2.0	2.8	2.8	3.2	3.8
Total hardness	25	27	22	33	28	25	20

Lyle Creek at Catawba, Catawba County (cont'd.)

Date	6-28-56	7-20-56	8-8-56	8-29-56
Discharge, c.f.s.	21.0	200	21.2	19.0
Calcium	5.9	4.2	6.0	5.9
Magnesium	2.1	0.9	1.7	1.3
Bicarbonate	36	18	39	36
Sulfate	0.2	2.9	0.3	1.0
Chloride	3.0	3.0	3.0	2.0
Nitrate	0.8	4.3	1.0	0.8
Hardness	23	14	22	20
Specific conductance	70.3	67.0	78.1	73.4
pH	7.0	6.2	6.8	6.8
Na + K	- -	5.8	- -	5.8

Linville River at Branch, Burke County

Date	11-13-44	3-9-48	3-2-54	9-7-54	4-27-55	7-20-55	3-28-56
Discharge (c.f.s.)	48	254	350	139	124	32.3	42.0
Suspended matter	2	- -	- -	- -	- -	- -	- -
Color	7	16	20	7	- -	- -	- -
Silica	7.6	6.2	5.9	5.7	- -	- -	- -
Iron	0.01	0.01	0.05	0.00	1.5	- -	- -
Calcium	1.8	1.3	1.1	2.0	2.2	5.0	4.7
Magnesium	0.7	0.6	0.3	1.0	- -	1.1	0.9
Na + K	2.6	1.7	2.7	2.6	- -	- -	- -
Bicarbonate	12	6	6	13	9	32	29
Sulfate	1.1	2.7	2.1	2.6	4.5	0.3	1.8
Chloride	1.2	0.8	1.5	1.0	1.2	5.0	9.0
Fluoride	0.1	0.1	0.0	0.0	- -	- -	- -
Nitrate	0.2	0.3	0.8	0.1	0.7	2.1	2.3
Dissolved solids	21	19	24	23	24	- -	- -
Total hardness	7	6	4	9	13	17	15
pH	- -	6.9	6.1	7.2	6.8	6.5	6.6
Specific conductance	- -	- -	21.0	30.5	19.9	81.0	90.1

Little Sugar Creek near Charlotte, Mecklenburg County

Date	8-11-46	4-29-55	10-5-55	3-20-56	4-12-56
Color	15	14	19	20	11
pH	- -	7.0	6.9	6.8	5.9
Silica	16	- -	24	21	17
Iron	0.03	- -	0.15	0.07	0.01
Calcium	16	18	21	17	21
Magnesium	4.7	4.8	5.4	4.5	4.8
Na + K	30	- -	40.3	51.4	31.2
Bicarbonate	95	133	105	101	19
Sulfate	13	19	39	78	103
Chloride	18	16	17	15	9.5
Fluoride	0.4	- -	0.4	0.3	0.0
Nitrate	8.0	0.5	0.3	0.7	2.6
Dissolved solids	167	194	200	238	198
Total hardness	59	65	74	60	73
Specific conductance	- -	315	313	380	322

McAlpine Creek near Pineville, Mecklenburg County

Date	12-13-49	8-9-50	5-18-51	8-29-51	4-17-52	10-2-52
Discharge, c.f.s.	30.9	5.56	15.5	3.67	37.9	11.6
Color	4	- -	- -	- -	- -	- -
pH	7.1	7.5	7.0	7.1	7.0	6.8
Specific conductance	141	150	156	110	131	118
Silica	25	- -	- -	- -	- -	- -
Iron	0.03	- -	- -	- -	- -	- -
Calcium	8.9	- -	- -	- -	- -	- -
Magnesium	5.2	- -	- -	- -	- -	- -
Na + K	12	- -	- -	- -	- -	- -
Bicarbonate	71	80	82	53	64	61
Sulfate	4.3	3	3	5	2	5
Chloride	5.0	4.5	5.2	4.8	5.2	4.8
Fluoride	0.1	- -	- -	- -	- -	- -
Nitrate	0.1	- -	- -	- -	- -	- -
Dissolved solids	96	- -	- -	- -	- -	- -
Total hardness	44	58	58	39	50	52

McAlpine Creek near Pineville (cont'd.)

Date	4-10-53	7-17-53	9-3-53	1-6-54	8-7-54
Discharge, c.f.s.	34.1	2.22	1.05	18.0	2.12
Bicarbonate	63	84	67	53	67
Sulfate	3	4	5	10	4
Chloride	5.2	3.0	4.5	6.2	5.8
Total hardness	50	60	48	45	49
Specific conductance	129	160	134	125	134
pH	6.8	7.4	7.1	7.0	7.3

McDowell Creek near Pineville, Mecklenburg County

Date	12-20-55	8-30-56	Sulfate	5.3	4.4
Discharge, c.f.s.	9.94	1.86	Chloride	5.5	5.0
Calcium	13	10	Nitrate	0.5	0.7
Magnesium	2.9	4.2	Hardness	44	43
Na + K	- -	8.4	Specific conductance	154	129
Bicarbonate	78	60	pH	7.1	6.9

McDowell Creek near Lucia, Gaston County

Date	3-9-48	Bicarbonate	32
Color	6	Sulfate	4.5
pH	7.0	Chloride	2.2
Silica	17	Fluoride	0.3
Iron	0.03	Nitrate	0.3
Calcium	6.6	Dissolved solids	58
Magnesium	2.3	Total hardness	26
Na + K	4.2		

Middle Little River near Millersville, Alexander County

Date	3-9-48	Bicarbonate	12
Color	3	Sulfate	2.7
pH	6.9	Chloride	1.4
Silica	7.3	Fluoride	0.1
Iron	0.03	Nitrate	0.4
Calcium	1.8	Dissolved solids	26
Magnesium	0.9	Total hardness	8
Na + K	3.2		

Middle Little River near Taylorsville, Alexander County

Date	9-9-55	6-8-56	8-23-56
Discharge, c.f.s.	8-72	16.0	13.6
Calcium	4.5	2.2	1.8
Magnesium	1.8	0.4	0.3
Bicarbonate	40	13	15
Sulfate	1.4	1.6	1.0
Chloride	1.0	3.0	0.6
Nitrate	- -	0.3	1.2
Hardness	19	7	6
Specific conductance	68.2	36.1	31.6
pH	9.2	6.9	6.5

Mountain Creek near Rutherfordton, Rutherford County

Date	6-26-50	1-2-51	4-24-51	7-12-51	8-28-51	9-21-51	11-5-22
Discharge, c.f.s.	41.1	43	51.4	33.8	26.8	24.9	28.6
Color	5	- -	- -	- -	- -	- -	- -
pH	6.9	7.1	7.1	6.9	6.9	7.0	7.0
Specific conductance	61.4	45.5	45.4	68.0	53.9	52.2	486
Silica	18	- -	- -	- -	- -	- -	- -
Iron	0.02	- -	- -	- -	- -	- -	- -
Calcium	3.2	- -	- -	- -	- -	- -	- -
Magnesium	1.0	- -	- -	- -	- -	- -	- -
Na + K	5.2	- -	- -	- -	- -	- -	- -
Bicarbonate	23	25	24	27	30	30	28
Sulfate	1.9	1	1	1	1	3	1
Chloride	1.4	1.5	1.5	1.5	1.8	1.5	1.5
Fluoride	0.1	- -	- -	- -	- -	- -	- -
Nitrate	0.4	- -	- -	- -	- -	- -	- -
Dissolved solids	41	- -	- -	- -	- -	- -	- -
Total hardness	12	15	15	14	17	19	18

Mountain Creek near Rutherfordton (cont'd.)

Date	2-4-53	6-3-53	3-2-54	7-9-54	8-6-54	9-8-54	12-22-55
Discharge, c.f.s.	44.7	26.6	62.2	26.2	20.0	14.0	18.3
Bicarbonate	26	25	21	23	30	23	28
Sulfate	1	1	3	8	1	1	0.8
Chloride	2.2	1.5	2.2	1.5	3.5	1.2	1.0
Total hardness	25	16	13	14	22	14	17
Specific conductance	53.5	48.4	43.2	45.1	70.3	47.1	47.2
pH	7.0	6.7	6.7	6.7	6.9	6.7	6.8
Calcium	- -	- -	- -	- -	5.2	3.2	4.2
Magnesium	- -	- -	- -	- -	2.2	1.5	1.7
Nitrate	- -	- -	- -	- -	0.7	0.3	0.3

Mountain Creek near Terrell, Catawba County

Date	3-9-48	8-24-56	8-30-56
Discharge, c.f.s.	- -	7.31	5.86
Calcium	3.6	7.1	6.4
Magnesium	1.8	1.6	2.1
Bicarbonate	23	38	36
Sulfate	2.6	1.7	1.7
Chloride	1.8	1.0	1.0
Nitrate	0.2	0.6	0.6
Hardness	16	24	25
Specific conductance	- -	72.4	71.2
pH	7.2	6.7	6.7
Color	2	- -	- -
Silica	14	- -	- -
Iron	0.03	- -	- -
Na + K	3.7	- -	4.7
Fluoride	0.1	- -	- -
Dissolved solids	40	- -	- -

Muddy Creek at Bridgewater, Burke County

Date	8-3-49	7-13-51	10-9-51	11-14-52	4-10-53	7-20-53	10-20-53	5-12-54	8-11-54
Discharge, c.f.s.	150	74.8	50.5	64.0	121	63.9	58.7	105	47.4
Color	4	- -	- -	- -	- -	- -	- -	- -	- -
pH	6.6	7.0	7.2	7.2	7.1	6.4	6.7	6.5	6.9
Specific conductance	38.8	68.8	75.7	112	58.7	53.0	68.7	60.5	99.7
Silica	1.5	- -	- -	- -	- -	- -	- -	- -	- -
Iron	0.10	- -	- -	- -	- -	- -	- -	- -	- -
Calcium	3.9	- -	- -	- -	- -	- -	- -	- -	- -
Magnesium	1.9	- -	- -	- -	- -	- -	- -	- -	- -
Na + K	6.0	- -	- -	- -	- -	- -	- -	- -	- -
Bicarbonate	24	25	29	44	21	23	25	25	26
Sulfate	3.2	2	1	3	3	1	2	2	3
Chloride	5.0	6.0	7.5	10	5.0	3.2	5.5	3.2	15
Fluoride	0.1	- -	- -	- -	--	- -	- -	- -	- -
Nitrate	0.4	- -	- -	- -	- -	- -	- -	- -	- -
Dissolved solids	52	- -	- -	- -	- -	- -	- -	- -	- -
Total hardness	18	15	18	22	14	11	15	22	13

Muddy Creek at Bridgewater, Burke County

Date	1-13-56	5-14-56	5-24-56	6-15-56	6-30-56	8-22-56
Discharge, c.f.s.	44.2	67.2	56.2	43.2	32.3	42.0
Calcium	3.6	4.0	3.9	4.4	5.0	4.7
Magnesium	1.4	1.1	1.4	0.8	1.1	0.9
Bicarbonate	27	26	28	16	32	29
Sulfate	3.0	1.8	2.3	2.4	0.3	1.8
Chloride	18	3.0	7.8	22	5.0	9.0
Nitrate	1.2	1.1	1.0	0.5	2.1	2.3
Hardness	15	15	15	14	17	15
Specific conductance	115	55.2	79.2	112	81.0	90.1
pH	6.9	6.8	6.8	8.2	6.5	6.6

North Fork Catawba River at Pitts, McDowell County

Date	6-6-49	9-18-50	3-16-51	7-12-51	8-27-51	9-20-51
Discharge, c.f.s.	215	29.1	45.6	10.2	6.92	6.65
Color	4	- -	- -	- -	- -	- -
pH	7.1	7.2	7.0	7.1	7.0	7.6
Specific conductance	53.8	67.2	46.1	73.2	84.8	84.2
Silica	6.5	- -	- -	- -	- -	- -
Iron	0.02	- -	- -	- -	- -	- -
Calcium	4.8	- -	- -	- -	- -	- -
Magnesium	2.5	- -	- -	- -	- -	- -
Na + K	2.8	- -	- -	- -	- -	- -
Bicarbonate	28	33	21	41	50	48
Sulfate	3.3	1	1	1	2	2
Chloride	1.0	1.2	1.5	0.8	1.5	1.0
Fluoride	0.1	- -	- -	- -	- -	- -
Nitrate	0.4	- -	- -	- -	- -	- -
Dissolved solids	38	- -	- -	- -	- -	- -
Total hardness	22	25	18	32	38	38

North Fork Catawba River at Pitts, (cont'd.)

Date	5-4-53	6-2-53	2-2-54	6-13-54	9-5-54	9-7-54
Discharge, c.f.s.	42.7	12.0	28.2	16.8	5.23	3.26
Bicarbonate	23	36	28	35	42	50
Sulfate	3	1	2	2	1	1
Chloride	1.2	1.0	1.2	1.5	1.2	1.0
Total hardness	22	30	23	25	35	39
Specific conductance	47.0	68.5	55.7	63.2	81.0	89.5
pH	6.7	6.9	7.3	7.2	6.9	7.1
Calcium	- -	- -	- -	- -	6.8	8.8
Magnesium	- -	- -	- -	- -	4.4	4.1
Nitrate	- -	- -	- -	- -	0.5	0.8

North Fork Catawba River at Pitts, (cont'd)

Date	1-13-56	5-4-56	5-24-56	6-15-56
Discharge, c.f.s.	9.45	26.7	9.05	7.26
Calcium	7.2	5.4	6.6	7.8
Magnesium	2.3	2.6	3.6	3.9
Bicarbonate	44	30	38	48
Sulfate	2.9	2.4	1.5	0.3
Chloride	0.5	1.0	1.6	1.0
Nitrate	27	24	31	36
Hardness	27	24	31	36
Specific conductance	74.0	56.7	67.7	83.1
pH	7.1	7.0	6.9	6.9

North Fork Catawba River at Sevier, McDowell County

Date	1-23-47	Bicarbonate	22
Color	7	Sulfate	3.0
pH	7.4	Chloride	1.1
Silica	3.3	Fluoride	0.1
Iron	0.07	Nitrate	0.1
Calcium	4.2	Dissolved solids	30
Na + K	1.5	Total hardness	20

North Pacolet River near Tryon, Polk County

Date	3-3-50	9-19-50	11-28-50	4-24-51	7-12-51	8-28-51	9-21-51
Discharge, c.f.s.	81.7	67.6	61.5	89.5	47.4	38.1	31.4
Color	4	- -	- -	- -	- -	- -	- -
pH	6.6	8.7	9.2	9.3	7.0	9.0	9.9
Specific conductance	62.1	87.9	98.5	78.7	57.2	132	184
Silica	14	- -	14	- -	- -	- -	- -
Iron	0.03	- -	0.03	- -	- -	- -	- -
Calcium	3.0	- -	3.0	- -	- -	- -	- -
Magnesium	1.2	- -	1.2	- -	- -	- -	- -
Na + K	8.6	- -	8.6	- -	- -	- -	- -
Bicarbonate	31	40	52	34	30	71	99
Sulfate	3.2	2	3	5	2	4	4
Chloride	1.6	2.5	2.5	2.0	1.2	3.0	3.0
Nitrate	0.3	- -	- -	- -	- -	- -	- -
Dissolved solids	45	- -	- -	- -	- -	- -	- -
Total hardness	12	13	11	10	15	12	19

North Pacolet River near Tryon (cont'd.)

Date	11-5-52	2-4-53	6-3-53	3-3-54	8-6-54	9-8-54	12-22-55
Discharge, c.f.s.	33.6	52.8	42.2	109	23.0	18.3	24.3
Bicarbonate	86	64	76	29	64	- -	- -
Sulfate	6	5	6	4	3	8	7.4
Chloride	2.5	2.5	3.0	2.2	3.2	7.0	2.5
Total hardness	18	15	12	11	17	12	13
Specific conductance	154	132	150	64.1	130	435	274
pH	9.7	9.2	9.5	7.2	9.2	10.6	10.2
Calcium	- -	- -	- -	- -	3.2	- -	4.0
Magnesium	- -	- -	- -	- -	2.2	- -	0.7
Nitrate	- -	- -	- -	- -	1.3	1.4	1.0

Sandy Run Creek near Mooresboro, Cleveland County

Date	10-23-51	Chloride	4.9
Discharge, c.f.s.	17.1	Fluoride	0.0
Silica	11	Nitrate	0.1
Iron	0.03	Dissolved solids	34
Calcium	1.5	Hardness	7
Magnesium	0.7	Specific conductance	50.8
Na + K	6.6	pH	7.0
Bicarbonate	13	Color	27
Sulfate	3.1		

Second Broad River at Bostic, Rutherford County

Date	4-24-51	7-12-51	10-10-51	4-16-52	9-11-52	11-17-52
Discharge, c.f.s.	172	87.2	65.3	209	83.0	112
Color	7	- -	- -	- -	- -	- -
pH	6.4	6.9	7.7	6.6	6.8	6.9
Specific conductance	93.1	96.9	110	68.4	108	108
Silica	17	- -	- -	- -	- -	- -
Iron	0.21	- -	- -	- -	- -	- -
Calcium	3.8	- -	- -	- -	- -	- -
Magnesium	1.6	- -	- -	- -	- -	- -
Na + K	11	- -	- -	- -	- -	- -
Bicarbonate	29	28	34	25	29	32
Sulfate	4.6	2	5	1	4	5
Chloride	7.2	12	12	5.5	15	12
Fluoride	0.2	- -	- -	- -	- -	- -
Nitrate	0.5	- -	- -	- -	- -	- -
Dissolved solids	61	- -	- -	- -	- -	- -
Hardness	16	18	22	17	20	16

Second Broad River at Bostic, (cont'd.)

Date	7-14-53	9-2-53	11-29-53	8-5-54	10-5-54	9-22-55	12-22-55
Discharge, c.f.s.	60.4	40.4	83.3	49.3	42.9	44.9	61.9
Bicarbonate	35	38	27	61	54	28	39
Sulfate	10	5	2	9	12	8.5	11
Chloride	16	9.8	2.9	26	26	35	16
Hardness	16	16	17	14	14	19	14
Specific conductance	130	112	57.5	195	204	203	151
pH	6.8	6.8	6.9	7.2	6.8	6.6	6.3
Calcium	- -	- -	- -	- -	3.2	- -	3.8
Magnesium	- -	- -	- -	- -	1.5	- -	1.0
Nitrate	- -	- -	- -	- -	3.3	- -	4.7

Second Broad River at Cliffside, Rutherford County

Date	11-11-44	4-27-55	10-19-55	3-20-56
Discharge, c.f.s.	202	182	96.9	150
Suspended matter	8	- -	- -	- -
Color	6	3	11	- -
Silica	15	14	16	15
Iron	0.10	0.01	0.06	0.06
Calcium	2.9	3.6	4.6	4.0
Magnesium	1.4	1.4	2.3	1.0
Na + K	12	7.4	29.4	19.6
Bicarbonate	32	23	39	32
Sulfate	3.1	4.3	4.3	8.6
Chloride	6.2	4.2	32	12
Fluoride	0.1	0.0	0.2	0.1
Nitrate	0.4	1.4	2.0	1.7
Dissolved solids	57	47	110	78
Hardness	13	15	21	14
Specific conductance	- -	66.9	189	107
pH	- -	6.8	6.8	6.7

Second Broad River near Forest City, Rutherford County

Date	1-30-47	Bicarbonate	39
Color	44	Sulfate	4.4
pH	7.25	Chloride	3.2
Silica	14	Fluoride	0.3
Iron	0.02	Nitrate	1.0
Calcium	2.5	Dissolved solids	68
Magnesium	1.3	Hardness	12
Na + K	14		

Second Broad River near Logan, Rutherford County

Date	6-26-50	9-19-50	Magnesium	- -	1.4
Discharge, c.f.s.	32.6	38.4	Na + K	- -	4.9
Color	- -	6	Bicarbonate	26	26
pH	7.1	7.1	Sulfate	2	1.8
Specific conductance	49.4	48.4	Chloride	1.0	1.8
			Fluoride	- -	0.0
Silica	- -	19	Nitrate	- -	0.1
Iron	- -	0.16	Dissolved solids	- -	46
Calcium	- -	3.8	Hardness	17	15

Silver Creek near Glen Alpine, Burke County

Date	10-5-49	6-26-50	11-29-50	3-16-51	7-13-51	10-9-51	7-23-52	11-14-52
Disch.c.f.s.	28.2	22.0	20.5	42.6	16.0	11.6	12.6	15.1
Chloride	1.2	0.8	1.8	1.8	2.0	1.2	1.0	1.2
Color	9	- -	- -	- -	- -	- -	- -	- -
pH	7.0	6.6	6.8	7.3	6.7	7.1	7.4	6.8
Hardness	14	16	17	14	13	15	14	13
Specific cond.	40.3	41.4	45.5	37.1	51.6	45.0	41.5	45.5
Silica	13	- -	- -	- -	- -	- -	- -	- -
Iron	0.03	- -	- -	- -	- -	- -	- -	- -
Calcium	3.2	- -	- -	- -	- -	- -	- -	- -
Magnesium	1.5	- -	- -	- -	- -	- -	- -	- -
Na + K	4.1	- -	- -	- -	- -	- -	- -	3.5
Bicarbonate	24	23	22	18	23	24	22	23
Sulfate	1.5	1	1	1	2	1	1	3
Nitrate	0.1							
Dis. solids	38							

Silver Creek near Glen Alpine, (Cont'd.)

Date	4-10-53	7-20-53	10-20-53	5-27-54	8-11-54	5-24-56	6-15-56	8-22-56
Discharge, c.f.s.	27.5	15.1	15.1	25.7	9.88	14.6	9.56	11.1
Bicarbonate	21	24	23	19	21	21	25	24
Sulfate	2	1	3	1	2	1.4	1.7	0.3
Chloride	1.2	1.8	3.0	2.0	1.0	0.9	1.0	0.5
Hardness	14	12	17	10	11	13	13	10
Specific conductance	41.4	46.2	54.3	37.7	39.8	43.8	41.9	47.6
pH	6.6	7.0	6.6	6.7	6.8	7.0	7.1	6.9
Calcium	- -	- -	- -	- -	- -	3.4	3.7	3.4
Magnesium	- -	- -	- -	- -	- -	1.2	1.0	0.4
Nitrate	- -	- -	- -	- -	- -	0.2	0.4	1.0

Silver Creek near Morganton, Burke County

Date	3-9-48	Bicarbonate	14
Color	7	Sulfate	2.8
pH	7.0	Chloride	1.1
Silica	11	Fluoride	0.1
Iron	11	Nitrate	0.2
Calcium	2.0	Dissolved solids	30
Magnesium	0.9	Hardness	9
Na + K	3.5		

South Fork Catawba River at Cramerton, Gaston County

Date	3-10-48	4-16-54	Chloride	2.4	3.2
Color	3	19	Fluoride	0.1	0.0
pH	6.6	- -	Nitrate	0.5	1.4
Silica	9.7	11	Dissolved solids	33	69
Iron	0.08	0.06	Hardness	12	35
Calcium	2.8	10	Specific conductance	- -	91.6
Magnesium	1.1	2.5	pH	- -	6.6
Na + K	3.8	3.3			
Bicarbonate	15	34			
Sulfate	3.2	8.6			

South Fork Catawba River at Lincolnton, Lincoln County

Date	2-5-46	Bicarbonate	13
Color	4	Sulfate	2.4
pH	6.6	Chloride	1.5
Silica	9.2	Fluoride	0.1
Iron	0.01	Nitrate	0.3
Calcium	2.4	Dissolved solids	26
Magnesium	1.1	Hardness	10
Na + K	2.4		

South Fork Catawba River at Lowell, Gaston County

Date	11-10-44	3-10-48	5-3-55	11-3-55	3-21-56	4-12-56
Discharge, c.f.s.	452	1,440	367	279	647	2,266
Suspended matter	9	4	- -	- -	- -	- -
Color	12	6.5	- -	20	5	25
Silica	15	10	- -	24	14	9.0
Iron	0.14	0.02	- -	0.23	0.02	0.04
Calcium	3.6	3.2	- -	4.8	5.1	5.1

South Fork Catawba at Lowell, Gaston County, (cont'd.)

Date	11-10-44	3-10-48	5-3-55	11-3-55	3-21-56	4-12-56
Magnesium	1.9	1.2	5.9	1.9	0.9	1.4
Na + K	6.2	3.3	1.9	10.5	5.8	5.2
Bicarbonate	26	16	31	31	22	15
Sulfate	2.5	3.3	6.4	3.5	6.1	3.9
Chloride	3.9	2.2	5.0	6.5	5.2	4.2
Fluoride	0.1	0.1	- -	0.2	0.2	0.0
Nitrate	0.8	0.3	2.4	1.1	1.7	2.8
Dissolved solids	48	34	62	68	50	39
Total hardness	17	13	22	20	16	18
Specific conductance	- -	- -	1,200	86.3	66.1	66.7
pH	- -	- -	8.0	6.7	6.8	6.8

South Fork Catawba River near Maiden, Catawba County

Date	3-9-48	Bicarbonate	9
Color	4	Sulfate	2.1
pH	6.6	Chloride	1.1
Silica	7.6	Fluoride	0.1
Iron	0.03	Nitrate	0.3
Calcium	1.4	Dissolved solids	22
Magnesium	0.7	Hardness	6
Na + K	2.4		

South Fork Catawba River at Spencer Mountain, Gaston County

Date	10-20-45	Na + K	5.6
Discharge, c.f.s.	382	Bicarbonate	23
Suspended matter	7	Sulfate	2.9
Color	4	Chloride	3.5
Silica	13	Fluoride	0.1
Iron	0.03	Nitrate	0.6
Calcium	4.0	Dissolved solids	45
Magnesium	1.3	Hardness	15

Stanley Creek near Stanley, Gaston County

Date	3-10-48	Bicarbonate	29
Color	5	Sulfate	3.3
pH	7.0	Chloride	2.2
Silica	16	Fluoride	0.1
Iron	0.02	Nitrate	0.1
Calcium	5.0	Dissolved solids	51
Magnesium	2.1	Hardness	21
Na + K	4.4		

Twelve Mile Creek near Waxhaw, Union County

Date	12-13-49	8-9-50	5-8-51	8-29-51	4-17-52	10-2-52	4-9-53
Discharge, c.f.s.	21.8	2.00	11.7	0.188	19.3	3.30	24.4
Color	7	- -	- -	- -	- -	- -	—
pH	7.3	6.9	6.7	6.7	6.7	7.0	7.0
Specific conductance	105	106	106	81.3	96.5	99.5	96.7
Silica	22	- -	- -	- -	- -	- -	- -
Iron	0.15	- -	- -	- -	- -	- -	0.04
Calcium	7.7	- -	- -	- -	- -	- -	- -

Twelve Mile Creek near Waxhaw (cont'd)

	12-13-49	8-9-50	5-8-51	8-29-51	4-17-52	10-2-52	4-9-53
Magnesium	3.6	- -	- -	- -	- -	- -	- -
Na + K	9.0	- -	- -	- -	- -	- -	- -
Bicarbonate	50	55	46	39	42	47	45
Sulfate	3.7	2	7	5	2	4	5
Chloride	6.0	4.5	5.5	3.8	5.8	5.0	5.5
Fluoride	0.1	- -	- -	- -	- -	- -	- -
Nitrate	0.1	- -	- -	- -	- -	- -	- -
Dissolved solids	76	- -	- -	- -	- -	- -	- -
Hardness	34	36	35	25	32	34	34

Twelve Mile Creek near Waxhaw (cont'd.)

Date	7-17-53	9-3-53	1-6-54	8-7-54	12-20-55	6-15-56	8-30-56
Discharge, c.f.s.	0.95	1.22	12.4	1.02	4.48	2.04	1.92
Bicarbonate	43	30	30	37	44	49	27
Sulfate	3	4	10	2	2.1	2.5	2.3
Chloride	4.0	3.2	5.5	6.0	5.5	4.0	3.0
Hardness	28	23	25	26	29	32	16
Specific conductance	91.1	66.9	89.6	83.8	93.2	97.4	65.5
pH	6.5	6.6	7.0	7.2	7.2	7.6	6.6
Calcium	- -	- -	- -	- -	7.1	7.9	4.8
Magnesium	- -	- -	- -	- -	2.8	2.9	1.0
Na + K	- -	- -	- -	- -	- -	- -	6.2
Nitrate	- -	- -	- -	- -	0.3	0.9	2.0

Warrior Fork at Morganton, Burke County

Date	1-22-52	Chloride	1.2
Silica	11	Fluoride	0.1
Iron	0.04	Nitrate	0.2
Calcium	2.8	Dissolved solids	30
Magnesium	0.9	Hardness	11
Na + K	2.5	Specific conductance	30.6
Bicarbonate	15	pH	7.4
Sulfate	1.7	Color	3

Warrior Fork near Morganton, Burke County

Date	9-17-54	9-9-55	6-8-56	8-21-56
Discharge, c.f.s.	16.6	31.3	40.6	- -
Calcium	2.0	2.3	2.5	2.4
Magnesium	0.7	0.5	0.2	0.3
Bicarbonate	15	16	13	17
Sulfate	1	1.3	1.5	4.6
Chloride	1.0	0.5	3.0	0.8
Nitrate	0.8	- -	0.5	0.8
Hardness	8	8	7	7
Specific conductance	32.3	28.2	37.9	34.1
pH	6.6	6.8	7.1	6.5

Warrior Fork near Oak Hill, Burke County

Date	3-9-48	Bicarbonate	9
Color	16	Sulfate	2.3
pH	6.9	Chloride	0.5
Silica	9.8	Fluoride	0.1
Iron	0.01	Nitrate	0.4
Calcium	1.4	Dissolved solids	23
Magnesium	0.5	Hardness	6
Na + K	2.4		

White Oak Creek near Collinsville

Date	9-22-55	6-15-56	Chloride	0.8	3.0
Discharge, c.f.s.	39.0	18.0	Hardness	5	12
Calcium	1.2	3.3	Specific conductance	22.5	55.2
Magnesium	0.5	0.8	pH	7.0	7.5
Bicarbonate	10	23	Nitrate	0.3	0.3
Sulfate	3.2	1.1			

Wilson Creek near Adako, Caldwell County

Date	9-22-55	5-22-56	6-8-56	8-23-56
Discharge, c.f.s.	39.0	59.8	44.7	27.5
Calcium	1.2	1.4	1.5	1.0
Magnesium	0.5	0.3	0.1	0.1
Bicarbonate	10	10	10	10
Sulfate	3.2	0.7	1.4	6.1
Chloride	0.8	0.1	0.5	0.1
Nitrate	0.3	0.1	0.1	0.4
Hardness	5	5	4	3
Specific conductance	22.5	18.4	18.1	21.4
pH	7.0	6.6	6.5	6.6

Warrior Fork near Morganton, Burke County

Date	6-8-56	8-21-56
Discharge	40.6	- -
Calcium	2.5	2.4
Magnesium	0.2	0.3
Bicarbonate	13	17
Sulfate	1.5	4.6
Chloride	3.0	0.8
Nitrate	0.5	0.8
Hardness	7	7
Specific conductance	37.9	34.1
pH	7.1	6.5

CHAPTER IX - ABATEMENT OF STREAM POLLUTION

Pollution-abatement Legislation - The General Assembly of North Carolina, on April 6, 1951, ratified an act to rewrite Article 21 of Chapter 143 of the General Statutes relating to Stream Sanitation. This act contains a declaration of policy as follows: It is hereby declared to be the policy of the State that the water resources of the State shall be prudently utilized in the best interest of the people. To achieve this purpose, the government of the State shall assume responsibility for the quality of said resources. The maintenance of the quality of the water resources requires the creation of an agency, charged with this duty and authorized to protect the water requirements for health, recreation, fishing, agriculture, industry, and animal life. This agency shall establish and maintain a program, adequate for present needs and designed to care for the future needs of the State.

The State Stream Sanitation Committee - The act created within the State Board of Health a permanent committee, to be known as the "State Stream Sanitation Committee". The duties of the Committee are (1) to develop and adopt classifications of State waters, (2) to survey all waters and identify those which ought to be classified, (3) to assign a classification to each identified water, and (4) to hold public hearings regarding assigned classifications.

Control of New Sources of Pollution - After the effective date of the assignment of classifications pertaining to the identified waters of any watershed within the State, no person shall, to an extent which would adversely affect the condition of the receiving water within such watershed in relation to any of the standards applicable to such water, (1) make any new outlet into the waters of such watershed, (2) construct or operate any new disposal system within such watershed, (3) alter or change the construction or the method of operation of any existing disposal-system within such watershed, (4) increase the quantity of sewage, industrial waste, or other waste discharged through any existing outlet or processed in any existing disposal system, or (5) change the nature of the sewage, industrial waste, or other waste discharged through any existing disposal system.

Actions by the Committee - The Committee adopted a series of classifications, and the standards applicable to each such classification, after holding, in 1953, public hearings at Asheville, Charlotte, Greensboro, Fayetteville, and Washington. It has assigned classifications to the waters of the Yadkin-Pee Dee, Whiteoak (including North, Northport, and New), Chowan, Roanoke, and French Broad River Basins. Classifications of the waters of the Cape Fear and Neuse River Basins are expected to be assigned during 1958. Surveys of the waters of the Catawba, Pasquotank, Tar, and Little Tennessee River Basins, upon which assignments of classifications to such waters will be based, are in progress.

Catawba River Basin - The State Stream Sanitation Committee initiated, in December 1955, a survey of water uses and pollution sources in the Catawba River Basin. This survey was in progress during 1956 and was completed in February 1957. Comprehensive water-quality studies, including determination of volume and strength of discharges of sewage and industrial wastes, were in progress from May 1957 to March 1958. Special plant-studies were started in April 1958. When the Survey has been completed, a pollution-survey report will be prepared. This report will contain proposed classifications of the waters of the basin. After these classifications have been considered at public hearings, classifications will be assigned to the waters, and a comprehensive pollution-abatement plan, for action by municipalities and industries, will be prepared.

Broad River Basin - Scheduling of initiation by the Committee of a survey of the waters of this basin is under consideration.

CHAPTER X - WATERSHED MANAGEMENT

General - Information regarding water controls; problems of watershed management; the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 2nd Session, approved August 4, 1956); the first annual National Watershed Congress (December 6 and 7, 1954); and the North Carolina Soil Conservation Districts Law, enacted by the 1937 Session of the General Assembly, may be found in Chapter XIII of "Water Resources of North Carolina, Department of Conservation and Development, 1955". The quoted publication comprises Volume I of a series of 11 volumes pertaining to the water resources of the State, of which the material herein, regarding the water resources of the Broad and Catawba River Basins, forms Volume VIII.

Soil Conservation Practices Accomplished and Contemplated - The data contained in the tables on pages 131 and 132 "Soil Conservation Practices Accomplished" and "Soil Conservation Practices Contemplated" were furnished by the State Conservationist, Soil Conservation Service, U. S. Department of Agriculture, Raleigh, North Carolina, for 14 counties, each of which forms substantial parts of the areas of the Broad and Catawba River Basins lying within the State of North Carolina.

These 14 counties are included in six Soil Conservation Districts as follows:

Soil Conservation Districts	Counties
Avery County	Avery
Broad River	Cleveland, Polk, and Rutherford
Brown Creek	Union
Buncombe County	Buncombe
Catawba	Alexander, Burke, Caldwell, Catawba, and McDowell
Lower Catawba	Gaston. Lincoln, and Mecklenburg.

All or a part of the following counties lie in the respective watersheds as indicated:

Broad River Basin

Cleveland	All
Henderson	Southern and eastern border, about one-fifth
McDowell	Southern border, about one-fifth
Polk	All
Rutherford	All

Catawba River Basin

Alexander	South, central, and western - two-thirds
Avery	Southeastern, one-fourth
Burke	All
Caldwell	All except northern corner, about four-fifths
Catawba	All
Gaston	All
Iredell	Southwestern, one-fifth
Lincoln	All
McDowell	All except southern border, about four-fifths
Mecklenburg	South, central, and western - three-fourths
Union	Southwestern, one-fifth.

SOIL CONSERVATION PRACTICES ACCOMPLISHED

ITEM	UNIT	ALEX-ANDER	AVERY	BUN-COMBE	BURKE	CALDWELL	CATAWBA	CLEVE-LAND	GASTON	LINCOLN	MCDOWELL	MECK-LENBURG	POLK	RUTHER-FORD	UNION	TOTAL
Closed Drains	Lin.Ft.	2,145	5,760	1,764	17,780	9,546	7,083	3,450	14,829	0	20,408	313	2,378	0	248	85,702
Conservation Crop Rotation	Acres	14,623	222	460	16,644	9,492	45,948	37,854	45,458	23,391	11,538	21,202	14,439	31,756	10,817	283,844
Contour Farming	Acres	17,984	240	79	14,574	8,796	39,680	29,295	28,507	36,695	13,112	19,596	11,249	35,680	6,991	262,478
Contour Strip Cropping	Acres	6,971	90	16	6,892	3,917	6,797	5,452	4,853	10,990	1,011	1,670	1,506	2,965	351	53,481
Cover Cropping	Acres	6,971	142	95	19,559	8,176	6,004	21,779	23,805	22,695	8,132	24,636	9,715	29,800	1,698	183,207
Critical Area Planting	Acres	106	0	71	0	141	0	365	182	77	257	2	14	340	0	1,555
Crop Residue Utilization	Acres	4,185	115	305	12,561	9,209	12,751	25,726	18,948	36,951	7,129	28,097	8,175	24,370	14,248	202,770
Drainage	Acres	166	142	20	1,563	1,023	842	237	3,607	174	922	782	680	293	57	10,508
Group Enterprise	Miles	0	0	0	0	0	0	0	16	0	0	0	0	0	0	16
Group Enterprise	Cu.Yds.	0	0	0	0	0	0	0	10,905	0	0	0	0	0	0	10,905
Improvement Cutting	Acres	7,147	9	38	22,314	16,484	11,287	3,384	13,957	9,070	19,977	173	9,549	9,006	4,127	126,522
Open Drains	Miles	7	1	1	15	16	12	2	26	5	33	15	16	7	5	161
Open Drains	Cu.Yds.	35,000	5,000	5,000	75,000	80,000	60,000	10,000	130,000	25,000	165,000	75,000	80,000	35,000	25,000	805,000
Pasture Planting	Acres	2,979	332	263	3,836	2,520	12,051	9,501	7,670	5,836	4,154	2	6,456	7,646	5,287	68,533
Pond Construction	No.	41	10	3	118	96	187	216	404	128	60	279	41	180	172	1,935
Sprinkler Irrigation System	No.	8	0	2	4	5	2	22	21	2	0	11	2	31	0	110
Sprinkler Irrigation System	Acres	105	0	21	80	48	40	1,460	404	50	0	224	105	570	0	3,107
Terracing	Miles	851	0	0	867	501	2,511	3,335	3,238	500	263	1,387	401	3,130	400	17,384
Tree Planting	Acres	404	34	95	786	314	652	1,193	2,836	644	0	794	1,131	993	340	10,216
Waterway Development	Acres	289	0	0	265	281	640	1,422	979	995	90	78	20	2,406	111	7,516
Wildlife Area Development	Acres	211	0	2	29	160	149	258	394	378	137	95	133	312	31	2,289
District Cooperators	No.	1,147	318	415	1,103	924	1,625	1,185	945	1,023	814	1,284	765	1,584	1,134	14,266

SOIL CONSERVATION PRACTICES CONTEMPLATED

ITEM	UNIT	ALEX-ANDER	AVERY	BUN-COMBE	BURKE	CALD-WELL	CATAWBA	CLEVE-LAND	GASTON	LIN-COLN	MC-DOWELL	MECK-LENBURG	POLK	RUTHER-FORD	UNION	TOTAL
Closed Drains	Lin.Ft.	30,355	7,796	161,124	103,320	21,888	10,822	1,950	55,871	9,000	22,092	5,127	27,622	75,000	1,600	533,567
Conservation Crop Rotation	Acres	4,087	2,614	724	12,832	6,353	28,312	85,334	6,055	36,154	13,696	36,516	3,007	10,210	7,691	253,585
Contour Farming	Acres	20,710	1,929	268	9,965	6,257	21,304	93,918	21,876	22,850	10,914	36,993	3,345	14,444	26,824	291,587
Contour Strip Cropping	Acres	1,054	1,798	477	548	6,529	9,138	36,968	9,097	7,285	15,970	3,601	8,094	6,309	27,237	134,105
Cover Cropping	Acres	2,156	2,629	367	9,777	5,458	6,614	101,434	27,708	36,850	8,600	35,157	3,234	7,668	8,193	255,845
Critical Area Planting	Acres	3,144	0	69	500	469	1,450	2,401	343	981	211	100	1,496	2,750	0	13,914
Crop Residue Utilization	Acres	13,284	1,685	759	16,775	9,783	12,170	97,487	32,565	22,592	9,630	31,696	8,764	7,793	16,811	281,794
Drainage	Acres	1,626	371	397	1,732	667	4,208	1,472	293	326	1,550	6,553	495	857	4	20,551
Group Enterprise	Miles	0	0	0	0	0	0	0	50	0	0	0	0	0	0	50
Group Enterprise	Cu.Yds.	0	0	0	0	0	0	0	20,000	0	0	0	0	0	0	20,000
Improvement Cutting	Acres	23,722	291	584	141,035	102,728	28,802	4,356	44,229	45,241	120,248	3,063	2,992	140	151	517,582
Open Drains	Miles	19	11	5	35	20	87	9	240	16	49	182	16	32	26	747
Open Drains	Cu.Yds.	95,000	55,000	25,000	175,000	100,000	435,000	45,000	1200,000	80,000	245,000	910,000	80,000	160,000	130,000	3735,000
Pasture Planting	Acres	24,794	1,103	1,115	10,701	14,888	3,477	38,049	2,862	13,117	14,079	100	4,093	787	4,234	133,399
Pond Construction	No.	90	27	9	127	343	307	32	488	41	74	197	25	49	122	1,931
Sprinkler Irrigation Systems	No.	57	8	44	49	333	131	205	27	17	58	16	52	115	0	1,650
Sprinkler Irrigation Systems	Acres.	603	0	439	995	4,008	1,580	10,216	666	340	500	320	830	4,480	0	8,115
Terracing	Miles	1,080	0	0	447	134	974	9,970	203	200	247	1,422	196	250	151	15,274
Tree Planting	Acres	9,424	1,362	398	6,483	7,689	6,540	7,922	6,056	2,167	3,000	1,178	1,974	8,500	1,834	64,527
Waterway Development	Acres	357	0	0	557	265	1,166	1,983	2,324	407	17	271	274	1,081	132	8,834
Wildlife Area Management	Acres	892	0	21	56	315	351	1,192	631	537	110	92	409	229	69	4,904
District Cooperators	No.	757	1,468	3,851	1,058	1,559	1,518	4,626	1,483	1,419	742	1,932	432	1,956	3,826	26,627

Most of Iredell County lies in the Yadkin-Pee Dee River Basin, and most of Henderson County lies in the French Broad River Basin.

Because of the manner in which soil conservation districts were originally organized, some districts include one county, which may lie in one, two, or three river basins, whereas other districts may contain, wholly or partially, as many as five counties. For example, parts of Forsyth County lie in the Cape Fear, Roanoke, and Yadkin-Pee Dee River Basins; six of the 16 districts, including one county, lie in two river basins, and eight and seven of the 37 districts, comprising the State as a whole, contain, wholly or partially, four and five counties, respectively. The records of the State Conservationist are maintained on a district, and on a county, basis. Consequently, when a county lies in two or more basins, it was necessary for the State Conservationist to use estimates instead of actual accomplishments in preparing the tables. He feels sure, however, that the figures on the two tables are accurate enough for all practical purposes.

The large number of district cooperators, shown on the table of "Soil Conservation Practices Contemplated" does not necessarily signify an unwillingness on the part of farmers in those counties to carry out soil conservation plans. On the other hand, it simply means that the small number of Soil Conservation Service technicians available in North Carolina have been unable thus far to work with all of these farmers. The State Conservationist hopes to reach them all as rapidly as possible.

Watershed Protection and Flood Prevention

Muddy Creek Watershed Project - Planning assistance covering Muddy Creek Watershed was requested, under the provisions of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, approved August 4, 1954), from the State Soil Conservation Committee, created by the 1937 Session of the General Assembly of North Carolina. The watershed was approved for planning. The State Conservationist, Soil Conservation Service, U. S. Department of Agriculture, issued a work outline for the project on June 17, 1957.

Muddy Creek joins the Catawba River below the Lake James Dam (Burke County), nine miles east of Marion, county seat of McDowell County. North Muddy Creek, rising in the southwestern corner of the corporate limits of Marion and flowing southeasterly and northeasterly, and South Muddy Creek, rising in the southeastern corner of McDowell County and flowing northeasterly and northerly, join, to form Muddy Creek, near the McDowell-Burke County line and about 8.5 miles east of Marion. The area of the watershed is approximately 97 square miles.

The storm of June 4 and 5, 1957, which extended over the upper Piedmont Plateau and, to a lesser degree, the mountain section of North Carolina and adjoining States, flooded approximately 1,524 acres of the Muddy Creek Watershed, severely eroded the small acreage of recently-plowed cropland, and caused floodwater, sediment, and indirect damages in the amount of approximately $56,000. The State Conservationist, in his special storm report describing the effects of this storm on the Muddy Creek Watershed, concluded that, considering the present agricultural economy and land use of this watershed, any significant reduction in flood damages from a storm of this magnitude could be accomplished only by the use of adapted structural-measures in combination with appropriate land-treatment measures for watershed protection and flood prevention.

Watershed Work Plan for the Muddy Creek Watershed - This plan was issued by the State Conservationist, on August 5, 1958, to all local organizations and participating State and Federal agencies. He stated that the plan is for information and review and that it is only a proposal to the Federal Government under

the provisions of the Watershed Protection and Flood Prevention Act (Public Law 566) and does not indicate an approved project.

The plan contains a description of the watershed, a statement of watershed problems, an indication of works of improvement to be installed, a comparison of benefits and costs of the proposed watershed-project, a statement of the measures for accomplishment of the plan, and provisions for operations and maintenance of the structural measures and the land-treatment measures for watershed protection and flood prevention. A summary of the plan is set forth below.

The Muddy Creek Watershed contains 64,000 acres. It lies in the foothills of the Blue Ridge Mountains, in the northeastern corner of McDowell County and the northwestern corner of Burke County. The watershed protection and flood prevention project is sponsored jointly by the McDowell County Commissioners and the Catawba Soil Conservation District.

The steep terrain on the perimeter of the watershed and the steep gradient of the streams cause flash runoff which results in flooding somewhere in the watershed about three times a year. Even though damages to crops are high, the productive capacity of the flood plain is such that it is still utilized for crops and pasture. Infertile overbank-deposition and flood-plain scour are damaging the flood plain, and 56 acres have been lost by swamping. Past sheet-erosion has removed 50 percent of the topsoil from the upland and reduced the productivity by 35 percent. The forest land is in fair to poor condition, and technical assistance is needed to improve forest-management practices.

This plan is a combination of land-treatment and flood-prevention measures which contribute directly to soil and water conservation, plant management, flood prevention, and farm drainage. Application of the measures will result in restoration of a small amount of productive flood-plain to agricultural use and a reduction in floodwater, sediment, and erosion damage to those lands currently in agricultural use.

The works of improvement, planned for the watershed, include land-treatment measures for watershed protection, land-treatment measures primarily for flood prevention, and structural measures for flood prevention consisting of floodwater-retarding dams and channel improvements. They will be installed within a period of five years at a cost of $990,567, of which $580,091 will come from P.L. 566 funds, and $410,476 from other funds.

Land-treatment measures for watershed protection include construction of terraces, field diversions, sod waterways, farm ponds, and farm drainage; seeding of pastures; establishment of strip cropping, permanent hay, and cover crops; and planting of trees. The cost will be $503,924.

Land-treatment measures, primarily for flood prevention, include roadside erosion-control; critical-area planting to grasses, legumes, and trees; and accelerated forest-fire protection. This protection would include construction of a commercial powerline to the Huntsville Lookout Tower in order that the two-way radio can be installed, the tower can be manned for a longer period of time, and the time between the detection of fires and their suppression can thereby be reduced. The cost is estimated to be $82,905.

The estimated total-cost of land-treatment measures is $586,829. The P.L. 566 share of this cost, and the share from other funds, will be $368,037 and $218,792, respectively. Structural measures consist of 23.4 miles of channel improvement and nine floodwater-retarding structures. The total cost is

estimated to be $403,738, of which $361,299 and $42,439 will be provided from P.L. 566 funds and from other funds, respectively.

The planned land-treatment measures for watershed protection will be installed by the landowners and operators in cooperation with the Catawba Soil Conservation District. The 151 miles of roadside erosion-control will be established by the N. C. State Highway and Public Works Commission with seed, fertilizer, and plants provided from 566 funds. The critical area will be planted to grasses, legumes, and trees by the individual landowners and operators. The powerline to the Huntsville Lookout Tower will be installed by the Forestry Division of the N. C. Department of Conservation and Development with P.L. 566 funds and other funds in equal portions.

The structural measures will be constructed under contracts administered by the sponsoring organizations.

The planned land-treatment measures will be operated and maintained by the landowners and operators in accordance with the provisions of their respective cooperative-agreements with the Catawba Soil Conservation District, with the exception of the 151 miles of roadside erosion-control which will be operated and maintained by the N. C. State Highway and Public Works Commission and with the exception of the accelerated forest-fire protection which will be maintained by the N. C. Department of Conservation and Development, Division of Forestry.

Catawba Soil Conservation District will operate and maintain the structural measures for flood prevention. The estimated annual operation and maintenance cost of $23,823 for structural measures and land-treatment measures primarily for flood prevention, when capitalized for the life of the project, amounts to $189,176. This cost increases the total-project cost, to be borne by other than P. L. 566 funds, to $599,652.

The average annual-benefits, resulting from the planned structural-measures and the land-treatment measures primarily for flood prevention, amounts to $39,949. With an annual benefit of $39,949 and an annual cost of $23,823, the project would have a benefit-cost ratio of 1.7.

Existing navigation projects - There is no navigation project on the Broad River or the Catawba River in North Carolina. These streams are not navigable, except for small pleasure-craft and only on the reservoir-pools.

The existing project for the Wateree River, formed by the confluence of the Catawba River and Big Wateree Creek about 20 miles above Camden, South Carolina, provides for a safe and unobstructed 4-foot navigation from the mouth to Camden, a distance of 66 miles. The Wateree River has an average width of 275 feet for its entire length of 73 miles through which it passes in a winding course from the "fall line", a few miles above Camden, to its confluence with the Congaree River. Depths in the stream range from 3 to 12 feet at ordinaty low water. The banks of the stream range from 3 to 10 feet above ordinary low water, and the bed and banks are composed of sand and mud. There has been no commerce on the stream subsequent to the year 1909, and the river has become so obstructed by trees and logs that navigation is impracticable at low stages. The water surface is greatly affected by the hydroelectric plant above Camden.

The existing project for the Congaree River, formed by the confluence of the Broad and Saluda Rivers at Columbia, South Carolina, provides for a 4-foot navigable channel over the lower 49 miles of the river, to be secured by dredging and bank protection, and for the construction of a lock and dam to extend deep water to Gervais Street Bridge at Columbia. The Congaree River has an average course. From its mouth to the lock and dam, two miles below the head of the stream at Columbia, the depths range from one foot to 10 feet at ordinary low water. With the lock and dam in commission, a depth of four feet can be carried to Columbia. The bed and banks of the stream are composed of sand and mud. On account of the abandonment, by navigation interests, of the stream as a commercial-traffic lane, no maintenance work under the existing project has been undertaken in recent years and, at ordinary low water, the channel is completely blocked by logs, snags, and sand bars.

The existing project for the Santee River, formed by the confluence of the Congaree and Wateree Rivers about 30 miles southeast of Columbia, is one for maintenance and provides for snagging the entire river. The Santee River, like the Congaree River, has an easy, winding course and, except for the lower 18 miles of the stream, the flow is along one main channel. This lower portion is in two channels, known as the "North Santee" and the "South Santee", the former of which constitutes the existing navigable-channel. The mouth of the Santee River is shallow, tortuous, and shifting, and it has never been improved. Traffic from upstream leaves the river 4.75 miles above the mouth to enter Winyah Bay through the Esterville-Minim Creek Canal, a portion of the Intracoastal Waterway. From this point to the head of the tidal reach at Lenuds Ferry, 33 miles upstream, the width varies from 500 to 800 feet, with channel depths ranging from 4 to 20 feet and with a controlling navigable-depth of about 6 feet for 98 percent of the time. The bottom and banks are composed of mud and silt, and the bank elevations range from 4 to 14 feet above mean low water. The tidal variation at ordinary range gradually decreases from a mean range of 3.5 feet at the mouth to a barely perceptible change at Lenuds Ferry. From this point to the head of the stream at the confluence of the Congaree and Wateree River, the average width is 400 feet. The depths at normal stage range from 4 to 12 feet, with a controlling navigable depth of 4 feet. The banks range from 2 to 10 feet, and the shore lands from 10 to 25 feet, above the normal stage of the river. With the decline of commercial traffic, snagging has been deferred and the channel is now badly obstructed by snags and logs.

Since 1941, the river has been closed to navigation at Wilsons Landing, 87 miles above the mouth, by the Santee Dam constructed by the South Carolina Public Service Authority. The 56 miles of river above Santee Dam, now known as Lake Marion, may be reached via the Cooper River and the Santee-Cooper Project.

Work undertaken prior to 1931 - Private interests and successively Colonial, State, and Federal Governments have undertaken improvements within the river system in the interest of commerce. Although the project works, constructed on the Saluda and Broad Rivers by the State about 1820, do not appear to have played the part in commerce expected by their designers, one portion is maintained by a local power-company and is used at present to supply power to operate the waterworks of the City of Columbia and for other purposes. The Santee Canal, connecting the Santee River with the Cooper River, was completed in 1800 by private capital. It was operated with more or less success down to the year 1840, with the exception of one interval during the years 1817 to 1819 when navigation was suspended from lack of water in the upper portions, caused by long- continued droughts. From the time of the completion of the South Carolina Railroad (now Southern Railway) from Columbia to Charleston in 1840 and of the Camden branch some years later, the canal traffic languished and became so unremunerative that the canal, soon after the year 1850, ceased to operate. During 1830, which was said to be the best year, 750 boats of about 2.75-feet draft, carrying 70,000 bales of cotton, passed through the canal. The Federal Government has undertaken the snagging of the Wateree River up to Camden and of the Santee during the periods in which the commerce has justified the expenditure of funds, and has provided a connection with Winyah Bay, first through the Mosquito Creek Canal, now abandoned, and later through the Estherville-Mimim Creek Canal, which now forms a part of another project.

Present status of investigation of navigation in the Santee River Basin - In a report transmitted to Congress on April 24, 1944 and printed in Senate Document No. 189, 78th Congress, 2nd Session, the Chief of Engineers recommended improvement of the Santee, Congaree, and Broad Rivers for navigation and power development, at an estimated initial cost of $51,510,000. As of January 1, 1953, an investigation of such improvement, requested by the Committee on Rivers and Harbors of the U. S. House of Representatives, was being made.

FLOOD CONTROL

General - In the Broad and Catawba River Basins in North Carolina, the areas affected by flood damage are usually rather narrow valleys and bottom lands lying along the river beds. Much of this land has been permanently flooded by the construction of impounding reservoirs for power development and, consequently, this land may be removed from any flood-control consideration. A large portion of the remaining property, subject to flood damage, would be inundated and abandoned when additional hydroelectric developments are constructed. As indicated hereinafter in Chapter XI, the cost of construction of flood-control-protection works either alone or in combination with power development, would greatly exceed the benefits which might be derived from such a plan and, therefore, the proposition would be economically unsound.

Flood of July 1916 - A tropical storm moved in from the Atlantic Ocean, passing over the coast of South Carolina on July 14. By the morning of July 15, the center of the storm had reached western North Carolina. Beginning during the afternoon of July 15 and continuing for 24 hours, the rains in the mountain districts of North Carolina were extraordinarily heavy, reaching a maximum, at Altapass, of 22.22 inches in 24 hours.

The flood on the Catawba River was the most severe of which there is

a record. At Mount Holly, Mecklenburg County, the crest was 22.5 feet above the previous high-water mark of the flood of 1908. Eighty persons were drowned in the streams of western North Carolina. Eighteen persons went down with the Southern Railway bridge at Belmont, Mecklenburg County, on July 16, and the majority of these were lost.

Floods of August 1928 and October 1929 - The 1928 flood caused the breaking of the power dam across Broad River at Lockhart, South Carolina, and the 1929 flood caused a gage height on the Broad River, at Blairs, South Carolina, of 38.5 feet. This height was 23.5 feet above flood stage, 2.6 feet above the mark of the July 1916 freshet, and 7.5 feet above the record of August 1908. These floods did not cause great damage in North Carolina.

Conclusion of the Corps of Engineers regarding flood control in the Santee River Basin - The following is quoted from House Document No. 96, 73rd Congress, 1st Session, published in 1933.

"The problem of flood control is local in character, does not affect Federal interests, and is not serious. The cheapest method of flood control would be by storage in reservoirs constructed primarily for power development, but the chief benefits would come from the protection of lands in the Coastal area and the cost would exceed such benefits. No improvement of this stream for navigation, either alone or in connection with power development, flood control, or irrigation or any combination thereof, other than as authorized by existing projects, should be undertaken by the United States at the present time."